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Field artillery with the other arms

Sir Edward Sinclair May

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M. Heward Bell.

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FIELD ARTILLERY

WITH THE OTHER ARMS

ITS EMPLOYMENT, ILLUSTRATED FROM MILITARY HISTORY, AND ITS RE-ARMAMENT WITH QUICK-FIRING GUNS DISCUSSED

BY
MAJOR EDWARD SINCLAIR MAY, R.H.A.
AUTHOR OF "GUNS AND CAVALRY," "ACHIEVEMENTS OF FIELD ARTILLERY," ETC.

WITH PLANS

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PREFACE

WITHIN the last few months so highly technical a subject as the re-armament of our Field Artillery has been publicly discussed by officers of almost every branch of the army, by sailors, and by civilians. Such a fact shows that it is rightly recognized that, in view of the enhanced importance of shrapnel fire, Field Artillery questions intimately concern every officer, and that occasionally, as in this year, one such question may become of universal interest and of national importance. An excuse, therefore, for again placing ideas on the employment of Field Artillery before the public is scarcely needed, nor for exhibiting the subject chiefly from the stand-point of the other arms. The introductory chapter on the study of Military History will not, I trust, be considered out of

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place, for the growth and importance of a confident interdependence of the three arms will best be appreciated by those who derive their knowledge of tactics from its broad pages.

EDWARD S. MAY,
Major, R.H.A.

ALDERSHOT, *November*, 1898.

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FIELD ARTILLERY WITH THE OTHER ARMS

CHAPTER I.

THE STUDY OF MILITARY HISTORY.

SINCE it seems to me that we must study military history ere we can hope to understand how to handle to the best advantage the arms at our disposal, I will, before I enter into any discussion as to their application, offer a few hints as to how and in what spirit such study should be approached.

To some it may seem strange that now, at the close of the nineteenth century, I should think it worth while to enlarge on so well-worn a topic. We live in an age of countless books, of free libraries, public reading-rooms, and a multitudinous press. If we are to judge by the aspect of the bookstalls at our railway stations, or the difficulty of getting the latest novel from a lending library, everybody is devoted to books, and not a little to those that deal with military history. Yet the truth is that the generality of our officers, whether of the regular or auxiliary forces, and an even greater majority (as is only to

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be expected) of the men they lead, give but little time to anything beyond what the pressure of successive examinations forces upon them.

I was inquiring the other day of a publisher as to the sale of military books, and he finished the discussion by saying, "The fact is the men in your profession don't read anything they are not ordered to!" Then, again, I noticed quite recently in a little book published in America and called "The Soldier in Battle," that across the Atlantic there exists in some minds (for the author presumably speaks for more than himself) a great prejudice against what we call the scientific education of generals, and that in that author's view no man who had graduated at West Point was worth a button in the field.

This is a specimen of what he has to say:— "Again I carried out with me from the ranks, not only the feeling but the knowledge derived from my own experience and from the current history of the war, that the military salvation of this country requires that the West Point Academy be destroyed. Successful commanders of armies are not made; like great poets they are born. Men like Cæsar, Marlborough, Napoleon, and Grant are not the products of schools." [1]

I do not think this opinion is a valuable one, because, as it happens, Grant and Lee (and many another good soldier too) were both at the institution he derides, and the latter, at any rate, will

[1] From "The Soldier in Battle," p. 12.

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bear comparison with all but the very greatest leaders of the world; but I presume that the author, as he said he did, represented the views of others besides himself, and undoubtedly there is an idea prevalent in some quarters that good generals are born, and not made.

The expression, "heaven-born leader," is one of the commonplaces of speech, and yet it may be proved that in almost every case a successful general has devoted himself to the literature of his profession just in the same way as the successful lawyer, doctor, divine, or even poet has studied that of his.

There is a time-honoured saying that "experientia docet." If every officer could have personal experience on the field of battle under modern conditions; if, in place of attending manœuvres, he could take part annually in actual warfare, very likely he might dispense with text-books. There would, in such a case, no doubt at first be terrible disaster, many lives would be lost that with forethought might have been saved, but the cruel lessons would have their effect in the long run; we may depend upon it they would be laid to heart, and the survivors of the initial reverses would no doubt develop into competent leaders. But we cannot be supplied with such realistic instruction, and therefore we fall back on the experience of others according to the manner in which in any other walk in life we shape our course.

If you have not yourself done a particular thing

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before, you go for advice and instruction to some one who has, and avail yourself of the benefit of his experience. And I may note here that the officer who despises theory and reading, and who prides himself on being "practical" as opposed to "scientific," invariably does the same the moment he is called upon to carry out any operation but that of the most stereotyped character.

Now the records of what our predecessors did in war simply place the results of their experience before us, and no one but a very rash or vain man would hesitate to avail himself of that experience. In fact, we might imagine that the more practical a man was, the more he would do so, because in place of puzzling a matter out from first principles yourself, it is shorter and quicker to get a solution ready-made by others for you.

But it is said that the conditions under which modern war will be waged are so widely different from those which prevailed, even fifty years ago, that there is little profit to be gained from the study, for example, of the Napoleonic wars. I have heard men assert that openly, and many, I am convinced, believe it, but are perhaps afraid to say so. Napoleon himself, however, did not forget to study the campaigns of Cæsar and Hannibal, and no more, for the matter of that, did Von Moltke.

It is indeed a mere truism to assert that the great principles which make or mar a campaign are eternal, but coming down to something smaller

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than the great principles, it must be admitted that we need the experience of our grandfathers and fathers to guide us.

To get examples to fit all the combinations of war, you must traverse a wide field. Wars are fortunately not of very frequent occurrence, and the modern ones have been of short duration, and have been fought under abnormal conditions in the two greatest instances.

We must go back a considerable way sometimes to find what we want, but in any case we could never dispense with the experiences of our grandfathers if we wished any basis of discussion left to us at all. Inventions are brought out and armaments alter almost every year; what was good enough in the eighties is not good enough or new enough now, and the novelty of ten years ago is perhaps obsolete to-day.

Where, then, are we to find a secure foothold, and on what but an ever-shifting foundation of speculation and possibilities are we to build our faith? On the other hand, facts, discreetly digested, are always valuable; they alone, whether they be culled from the experiences of our contemporaries or our ancestors, are beyond dispute, and when we find the same facts occurring again and again, it means that they are due to the operation of some essential characteristic of human nature, and we need not hesitate to apply to even the most modern situation the lessons indicated by them.

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It is therefore an abuse of military history to confine our range of vision artificially, and to study only the latest campaigns, because in them conditions existed most nearly approaching those of our own time. And this is so more especially because those who perhaps will profit most by the study of military history are the higher leaders, and their influence is chiefly felt nowadays in the realm of strategy, that is to say, before rather than during a battle.

The principles of strategy do not vary, and strategy, or the science of making war on the map, is not affected by changes of armament, although it has been influenced by the introduction of railways and some other modern inventions, just as all considerations are modified by the circumstances of the moment. The precepts of all those who have excelled in war are in this respect the same.

There is in Von Moltke's "Tactical Problems" [1] drawn up for the instruction of the staff officers of the German army, a passage which puts the matter very well. "Der Grosse Schweiger," a man who was a great student all his life, and in his old age showed himself great in the field also, there says:—"We are dependent on an infinite number of factors like wind and weather, fogs, wrong reports, etc.

[1] Von Moltke's "Tactical Problems," 1858-1882. Edited by the Prussian Grand General Staff. Authorized translation by Karl von Donat.

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"If, therefore, theoretical science alone will never lead us to victory, we must nevertheless not entirely disregard it. General von Willisen very truly says: 'It is a long step from knowledge to doing, but it is a still greater one from not knowing to doing.'

"The best lessons for the future we draw from our own experience; but, as that must always be limited, we must make use of the experience of others by studying military history. Besides which, another means of furthering our education is the working out of such supposed warlike situations as our problems present."

And Von Moltke's opinion is but a reflection of those which have come down to us from Napoleon and many another brilliant genius. Napoleon, who assuredly was a heaven-born leader if ever man was so, who startled the whole world by the sudden brilliancy of his military career, advised every one who would imitate him, "to read and read again the campaigns of Alexander, Hannibal, Cæsar, Gustavus Adolphus, Turenne, Eugene and Frederick."

That he himself studied them closely is well known, but he did not despise the experiences either of far smaller men. No effort of the great Emperor's genius is more admired than his first Italian campaign of 1796. None bears more strongly the impress of a master mind, and none is more worthy of probably the greatest military intellect the world has ever seen.

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Yet that was his first campaign. It is the work of a soldier without previous experience in the command of armies, of a young man who had never seen large bodies of troops opposed to one another in the field at all, had never been at manœuvres such as are held for instruction nowadays, and who must have depended for knowledge on books and the experience of others alone. That a man with such antecedents was able to beat experienced generals at their own game, and was able, not only to do well in his first attempt, but to surpass the efforts of almost any other general, is surely an eloquent argument in favour of reading military history, and there is ample evidence that in this particular instance Napoleon owed something to the study of past campaigns.

For in 1745 there had been also a campaign in the same territory conducted by a Marshal Maillebois, whose name is unknown to most people, and who is never quoted as a master mind in war. And there is unimpeachable evidence that Bonaparte knew of a very detailed and lucid history of the campaigns of this Marshal which appeared in 1775, and that when he went to take command in Italy he applied to the Minister of War at Paris that he should be supplied with it and the accompanying plans. The assent of the Minister is still extant, and it is therefore reasonably certain that Bonaparte had the work with him.

Not only that, but there is a considerable

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similarity between Napoleon's conduct of the campaign and that of his forgotten predecessor. In both cases the object was to separate the allies and beat them in detail, in both cases the same passes through the Maritime Alps were utilized, and in both cases the first objective was the same.

I do not quote this example in any disparagement of Napoleon. The credit is his just as is the crown of poetry Shakespeare's, although the latter often based his masterpieces on stories already turned to account by others; but it is nevertheless an interesting example to us, and another demonstration of the truth that genius consists in taking infinite pains, and neglecting or despising nothing that may aid you on your way.

As regards reading, all the greatest soldiers have indeed set us an example which we would do well to follow.

Napoleon has recorded his admiration for Turenne, and has stated that that great leader had made himself what he was by a laborious study of the art of war.

Wellington told General Shaw Kennedy that he had made it a rule to devote some hours every day to study; and Von Moltke has admitted how much he was indebted to the Great Frederick.

I will not weary my readers by quoting further evidence in support of my contention that soldiers should study their profession as carefully as other men of business do theirs. I believe most people

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really think so nowadays, and that the old—what I may call Philistine—views are dying out.

But there are different ways of studying, and time may not be as profitably spent as possible even in a library.

We have of late been flooded with memoirs and reminiscences of celebrated warriors, and the demand for these books argues for their popularity. Every now and again in them we come across facts which are undoubtedly of great service to us towards a study of our profession, small details which perhaps help to fill up the evidence necessary to elucidate some disputed point in a great controversy, or corroborate what we may have had reason to suspect already.

But there is a good deal often of the tittle-tattle of history in them too, and they are occasionally rather more amusing than valuable. There is likewise a danger in pushing research in the direction of what I may call antiquarian interest too far. The details of pay or interior economy, or of the pattern and variation of uniform and equipment sometimes occupy too large a space in the minds of readers, just as Napoleon tells us how the King of Prussia and Emperor of Russia, when in conversation with him, argued about the number of buttons a dragoon should have on his jacket, and clearly thought it an astonishing carelessness in him that he did not seem to care to take part in the discussion.

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I have known men bestow infinite pains and much time and labour in an endeavour to decide whether there was one gun more or less in a battery on some particular spot, or as to the precise formation of a body of troops. I know that I have met officers crammed to the brim with the names of the commanders of the various units during a campaign, the exact pattern of the guns and of the rifles, and perhaps so absorbed in their study that they disregarded the real causes that contributed to failure or success.

I do not say that such close analysis is not often valuable; I think patient delving amongst old records occasionally produces very valuable results, but such labour should be undertaken with some practical object in view, and, while not necessary for all, is not even desirable for young men, except as a pastime or amusement. What we should rather desire is that officers should read and continually apply their reading to the circumstances of our own time, draw inferences with judgment, and make recorded facts and incidents, as it were, act as pegs in the memory on which to hang principles of value for every-day use.

It is for this reason that I regret that we have nowadays so much tactics and so little history in the courses of study our regimental officers have to go through, and that I would wish men to read more for the sake of acquiring general knowledge than because they may have to answer certain questions.

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I would have a cavalry officer familiar with the deeds of Seydlitz and Kellerman, Lasalle and Von Bredow, remember Rossbach, Zorndorf, Marengo, the pursuit after Jena, and the surprise of Vionville, and eager with an ambition to emulate such deeds as those.

I think every gunner should know the story of Vittoria and Wagram, of Hasse's and Gnügge's batteries at Gravelotte, of the "battery of the dead" at Königgrätz, and should enter a battle animated and sustained by the remembrance of the great performances of his predecessors on those occasions.

Similarly every infantryman should be persuaded of the invincibility of his arm, not because of the powers of the modern rifle which he may handle, but because his predecessors showed him the road to victory when they fought at Quatre Bras, at Inkerman, or at the Shipka Pass.

To read for the purposes of the moment is only, however, one outcome of the spirit which has invaded many of our ideas and institutions in this nineteenth century; everywhere people look for quick returns brought about with a minimum expenditure of trouble or time, and there is thought to be no opportunity in these crowded days for the thoughtful and patient labour which characterized the methods of our fathers. Men now only wish to learn just what will be the most useful at the moment passing over them, and the system of examining officers according to a

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progressive standard, has something to do with it. Officers too really are busy now when with their regiments, and naturally when pressed for time turn it to the best account for examination purposes.

Thus it is that "Tactics," and that, too, in a very condensed and artificial form, has pushed history somewhat to one side, and that we find men learning by rote what is likely to be asked rather than what may be very valuable some day, but is not so perhaps at the present moment. Thus it is that text-books are full of data as to the exact number of inches bullets will penetrate into various materials, and that minute calculations as to the exact time a certain force will take to move from one formation and get into another, or that necessary for the last man to move off parade when a force is making a march, fill the minds of students.[1] Or they learn by rote "the characteristics" of the various arms, or the degree of slope on which they can move.

[1] Napoleon's method is here interesting, and is thus accounted by Jomini, in his "Art of War":—"Provided with a pair of dividers, opened to a distance by the scale of from seventeen to twenty miles in a straight line (which made from twenty-two to twenty-five miles, taking into account the windings of the roads), bending over, and sometimes stretched at full length upon his map, where the positions of his corps and the supposed positions of the enemy were marked by pins of different colours, he was able to give orders for extensive movements with a certainty and precision which were astonishing. Turning his dividers about from point to point on the map, he decided in a moment the number of marches necessary for each of his columns to arrive at the desired point by a certain day, etc."

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A subaltern will regard it as a waste of time to penetrate as far as a captain is required to, and the latter will be careful not to cross the limit assigned to a man of his rank. Yet it is while we are still young that our ideas are most easily moulded, and it is our early training which sticks to us through life. A man's responsibilities, too, become greater as he becomes older, the command of a battery, battalion, or regiment implies a considerable amount of office work, and when he attains to it he has less time to read, and is often too weary of books to do so.

Neither do the chances on active service come only to the seniors. Bonaparte at Rivoli and Wellington at Assaye were younger than are many of our subalterns, and the exigencies of a campaign may easily throw a command upon a youth which in peace time he would not inherit till he was grey-headed. A subaltern may easily have to take the place of major, or even colonel, at a moment's notice, for be it remembered that at Vionville the Fusilier battalion of the 40th regiment lost all its officers between 10 and 11 a.m. Facts, formulas, and statistics baldly put are soon forgotten when the emergency for which they were learnt is past and done with, and studied in that way the dry rules which are culled from military history soon come to be regarded by the student rather as useful for examination purposes than for practical application in the field.

There is another plan, which we can hardly

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afford to despise, and that is, if possible, first to imbue a boy with the spirit and love for the game, to make him understand its broad features, and then, when you have roused his attention, lead him on to examine into the causes that produced victory or defeat. If you wished a boy to become a good whist player, you would not begin by making him read extracts from Cavendish. You would let him play "Bumble Puppy" first of all, and then gradually entice him to mould his play on scientific principles, little by little carrying him further as his interest grew.

It is an abuse of a most entrancing part of literature to cut out all the romance and human nature and leave only the dry facts to be learnt by heart.

A pudding with all the plums pulled out may be equally nutritious, and, theoretically, more wholesome than one rich with such attractions, but a child, for all that, will not enjoy it, and even if compelled to swallow it, will not derive the same benefit as if it had been devoured with zest and pleasure. A boy (and an officer is often still a boy, even though he may have been a good many years in the service), when he first reads campaigns, will pick out all the fighting, just as a child will seize the plums in the pudding, and, if it arouses his interest and enthusiasm, it is quite right that he should do so. But very soon, if he has intelligence, he can be led to inquire how and why the encounters which delight

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him were brought about, the glowing tale will tempt him also by degrees to investigate closely the reason why one hero was defeated, or why another won, and he will soon begin to probe into the mechanism which sets military machinery in motion. He can gradually be made to understand that there are certain rules which are the outcome of experience, and which it is hazardous to infringe, and finally he may be drawn to inquire into the host of technical minutiæ which go to build up efficiency in vast bodies of troops. He will look at things first of all from the purely general view of a spectator, then as a professional man seeking guidance, ultimately he may devote himself as an expert to some small detail of the machine, or even set himself to master all the niceties of a most complex organization. So that it will be understood that while it is an abuse of military history to read it as one reads an exciting novel, and leave the dry details altogether out of sight, it is equally an error to trust only or chiefly to a knowledge of them and to despise the less technical writings.

A soldier ought to be so saturated with the spirit of military principles that he will act in a crisis almost intuitively.

He ought to be so imbued with knowledge that it may be no effort of memory for him to consider what he ought to do. And I believe there is no better way of fixing knowledge in the mind than by means of apt illustrations from real life. It will make little impression, perhaps, if you tell a boy or

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a man not to bathe in a particular place, because there are dangerous currents or weeds there, and he will very likely not heed you; but he will prick up his ears if you tell him that Jack So-and-so was drowned in that very spot five years ago.

It is the fashion to suppose that the officers of our army read very little or knew very little of the science of war at the commencement of the century. I doubt very much if this was really so much so as is generally supposed. I know that I have often been surprised at the number of military books I have found in the libraries of country houses collected, perhaps, by some father or uncle who was a Peninsular veteran.

And the same thing has struck me when reading old letters, such as those recently published by Colonel Siborne. When fighting on a grand scale was constantly going on, and our opponents were the greatest military nation of Europe, it would indeed be surprising if some of our officers, at any rate, did not give some thought to a science on which their lives depended.

When the Union Brigade went tearing down the slope on D'Erlon's corps and the third line was not held back in reserve, did not Lord Anglesey blame himself, and that the more so because he admitted that he ought to have known better from previous personal experience in Spain? And did not the officers know that it was all wrong, too, just as well as though they had passed for promotion? Certainly they did. In one of the letters I have just referred

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to, there is a passage about this very incident which says, "Every cornet knew what would happen."

And yet Von Bredow, in 1870, charged without support, and his brigade was cut up just as was ours at Waterloo and for exactly the same reason. If Waterloo had been kept in mind would not the 6th Cavalry Division have been sent to his support? And will it not be of advantage to us if our future cavalry generals lay the lessons of military history to heart, and, when they launch their squadrons, remember what happened to both Lord Anglesey and Von Bredow, and profit by such experiences?

That an attack by infantry should be duly prepared by a concentrated and fierce cannonade on the point of assault is again a principle which Frederick the Great learned by bitter experience at Kunersdorf. Read that story and note how the power of artillery, even at that comparatively primitive stage of its development, was able to assert itself, and how the neglect of that salutary principle of tactics which I have just quoted brought sure ruin in its train.

A German writer has truly said that had the precepts of the great king been regarded in 1870 many a German soldier's life would have been saved. Here we have another lesson from real life which should have been laid to heart, and, had Kunersdorf not been forgotten, the smooth glacis of St. Privat would not have been strewn with dead. But St. Privat and Kunersdorf, and many another lesson too, were all lost sight of by

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the Russians at Plevna, and the neglect of what the lessons of military history have taught us led once more to confusion and disaster. At Lovtcha we see, on the other hand, how the teachings of military history were paid attention to, and the best results were achieved.

Is it not right, then, that we should endeavour to fix such names and the experiences they bring with them in the minds of our officers, so that in the hour of need they may be present to their minds, and that they may remember Kunersdorf and Vionville and St. Privat and Lovtcha, in order to profit by the mistakes or successes of those gone before?

But it is not only to furnish precedents, or as an *aide-mémoire*, that the study of military history is valuable.

There is surely a moral benefit to be derived from it, which we should not neglect in educating a younger generation, and we should not reduce everything in our instruction to its exact commercial value as quoted in the morning's papers. Even city men recognize that there are some investments valuable as a "lock-up."

Military history is surely the mother of *esprit de corps* and patriotism and self-respect, and without these the best equipped army in the world will crumble under the stress of privations or disaster. We may not find many valuable tactical or strategical lessons in the history of the Crimean War, but is that any reason why the story ought not

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to be familiar to every man who wears the Queen's uniform? Is there not a lesson and a worthy example in the tale of how the mud and frost and snow and wind were patiently endured by men ill-clad and only half-fed, and of how they bore themselves through it all till success came to them at length? Or did our men to no purpose brave the scorching heat of the ridge at Delhi, even though that siege does not furnish "a text-book example" to be studied for the next examination? I say that tale and many another from every climate and every quarter of the globe should be read and read again, even as Napoleon advised his son to study the deeds of "the great captains," and it is from the foundation of the enthusiasm and resolve engendered by the memory of what our forefathers suffered and accomplished in the past that we should make our effort to rise to mighty deeds in the future.

Nor should the mental nourishment offered to our boys be too concentrated or boiled down to the severely utilitarian dimension of an essence.

There may be as much information in a paragraph as in a chapter, as much or more food in a meat lozenge or two as in a mutton chop, but for all that, in spite of theory, the one will be more welcome and more beneficial to a man mentally or physically hungry than the other. What we want, moreover, is to teach officers to face responsibility freely, not to be always trying to remember what the text-book says, but rather to

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be guided by what the lie of the ground and the circumstances of the moment seem to dictate.

They must read, but I cannot too often repeat that they must be taught to realize how circumstances may modify schemes, and how what may have been wise in one case is not judicious in another. I have already spoken of Von Moltke's "Tactical Problems." There is one example in them of particular interest. It is the old difficulty of crushing an opponent between two converging forces which is being discussed, and we must bear in mind that the great strategist's own plans in 1866 had been hostilely criticized by some.

That he fully appreciated the risks involved and yet gave due weight to the altered conditions of warfare brought about by the telegraph, is amply evidenced when we hear him say:—

"If we succeed in attacking him on two sides and in effecting the junction of two columns on the battle-field, the greatest results are certainly to be expected. So we have done, for example, at Königgrätz in 1866, but is it permissible to suppose this here? No; the enemy will evade such an attack, or assume the offensive himself, in order to fall upon one of our separate bodies with superior numbers."

Again, who can be more full of practical common sense than this great student in his following remarks on another problem?—

"Gentlemen, you can do that only on paper, not in reality; there it would be quite different.

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Others again have shifted the bivouac in the evening. Gentlemen, imagine the situation as it is in reality. The division only moved into bivouac in the evening, and, therefore, after a long march; the kitchens are dug, the kettles are on the fire. Then comes a General Staff Officer and says: 'The bivouac is to be shifted, you must move a little bit further.' Then the men must start again, the horses must be harnessed, the meat cannot be boiled. One does not really do so in reality."

Now it is because it promotes the constant reference of what is proposed *to be done* to what actually *has been done* in war, the judicious weighing of what is *possible* with what is *practical*, that makes military history so valuable. The knowledge we derive from it should be regarded as a great storehouse of experiences from which, if we only possess the catalogue, we can obtain an example which, considered with due regard to the circumstances of the moment, may help us to a sound conclusion.

What we want to do then, first of all, is to fix military history in the memory, and to do this I do not think it is possible to overrate the benefit to be derived from its study on the ground where the actual events took place. Some years ago I spent a month with some officers in the Austrian army at Vienna, and I was fortunate enough to get leave to accompany one of the classes of field officers preparing for promotion in its work.

As my readers will know, the neighbourhood of

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Vienna is rich in reminiscences of the Napoleonic wars. There are the battle-fields of Wagram and Aspern and the island of Lobau, with the traces of the French occupation still quite distinct. Landmarks of stone are placed to show the details of the great camp formed there in the early summer of 1809. You can see the spot where the Emperor's tent was placed, the site of the hospital, of the graveyards, the powder magazine, &c.

The positions of the various bridges which were thrown across the Danube are also commemorated, while the works thrown up to protect the camp and the roads made by Napoleon still remain almost in their entirety.

To read history on such ground was a delightful experience, and I was much struck by the manner in which such advantages were turned to account by the staff officers who were the instructors of the course. We walked over the ground and listened to a lecture on the events which had occurred there, and subsequently groups of officers were sent on various errands which helped to fix in their memories the problems and difficulties which were presented to the minds of those engaged at the commencement of the century.

One party sketched the bend of the river, another the available camping grounds, a third mounted the spire of the neighbouring village of Enzersdorf, and brought back a report of all the country that was visible from thence, some meanwhile followed the passage of the French troops,

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some studied the arrangement of the camp, and thus a clear impression of the events of 1809 was carried away.

Another day or two was devoted to the battle-field of Wagram, and the tactical lessons to be drawn from that mighty struggle were considered on the scene where it actually took place. Such a manner of studying military history is undoubtedly the best; but unfortunately, or fortunately, in England we have no modern battle-fields to visit.

We are, as a nation, however, much given to travel, and no very great effort is necessary in order to visit the ground round Metz, and the battle-fields of Waterloo and Quatre Bras. Foreign, or, at any rate, Austrian officers, travel but very little, and only comparatively few have indeed been in foreign countries at all, but they can fall back on what they find at home, and have military history, so to speak, at their doors.

Not but what I think something is still to be learnt even from the mediæval battle-fields which we do possess, and which few people ever go to see. Those of the Civil War, at any rate, can still enforce a lesson, if only they bring home to us the genius of Cromwell and his ability as a leader of horse. And wandering over them during a holiday will set many a brain which is stored with military history thinking.

It scarcely comes within the scope of what I have to say in this book, but it is possible to give

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special and unique interest to educational exercises by an attempt to reproduce a fac-simile of some foreign battles on our soil at home. Just as a situation analogous to such a one as that which preceded the crossing of the Sambre by Napoleon in 1815 can be placed before us on the maps of a war game, so may it be at least partially revivified on the hills and valleys round our garrison towns. If troops are not to be had, and it is not often that they can be present in sufficient numbers, the positions of imaginary units may be shown by flags, and orders may be written just as though the men were there in the flesh. And this brings me to another method of instruction in Austria which had, I thought, good results. Officers were given a small force, the different component parts of which were represented by various coloured flags. Thus a white banderole may have stood for a battalion, a red one for a battery, and a blue one perhaps for a squadron.

General and special ideas were drawn up and orders were written out as they are at a war game. Then the banderoles were placed to mark the positions selected for the troops on the ground itself. Sketches of the position showing the manner in which it had been occupied were then made, and a criticism was given on the ground just as is the case after a field-day at Aldershot. We have done the same sort of thing in this country in the form of "staff rides," and I think those who have had the privilege of taking part in such

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exercises will agree with me that there is a great deal of instruction to be gained from them.

The interest will be heightened if it is possible to say to an officer after the work is over, "Well, you were confronted with much the same difficulties and on much the same sort of ground as faced Graham at Barossa, or Valentine Baker at Tashkessen."

His curiosity will be roused if you add, "This is what happened," or, "This is how so and so got out of the scrape." Although the similarity may not be always complete, still the introduction of even the small amount of realism and human nature indicated here will tend to waken attention and adds piquancy to what otherwise is apt to be regarded as a dull academic exercise. The touchstone of fact applied even to this slight extent, quite changes the attitude of many a man's mind and awakens sympathies and interests which would otherwise go on slumbering indefinitely.

Finally, in these days of long ranges and wide distances, we must remember that the strategical nature of operations has acquired an enhanced value. It is not possible any longer even for comparatively subordinate leaders to influence the character of the fight, or to make good deficiencies of plan by a quick or clever tactical movement. Tactics in the presence of the enemy are now elevated very nearly to the height of strategical movements which direct the great blows of a campaign.

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Strategy relies on tactics to achieve its objects, but the best tactics will but rarely atone for a false strategical situation. Similarly, a well-directed attack may succeed just because it rests for its success on the foundation of a judiciously conceived plan, and a badly directed one will fail, in spite of the bravery and skill of the subordinate leaders, for the opposite reason. The general on the field of battle can, nowadays, only sketch in the broad features of his conception, and must leave details of execution to those beneath him. His influence, therefore, is likely in the future to have more of a strategical character than was formerly the case, and it is strategy which is pre-eminently taught by a study of military history.

Strategy deals with principles, not with details of execution; it is the spirit, and not the letter of the law, which it reveals, and while an appreciation of the former produces generals, a rigid resistance on the latter may develop a pedant, and pedantry has led, perhaps, to more disaster in war than any other vicious tendency.

Again, while in the less urgent moments of active service we require men to know minute details, in the supreme crisis of war, when their own fate and the fate of those they command depends on the soundness of a decision which has to be formed on the impulse of the moment, we look to them to act almost intuitively, and thus to act means to strike in accordance with broad principles which, even if they do not ensure

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victory, at any rate, make it more attainable, which promise the greatest results to a success, while they minimize the risk of a disaster.

Such principles are part of the eternal truths of the world. They do not alter with equipment or armament, and change but little even with the lapse of centuries. They rest ultimately on human nature, and that is a quantity which has varied but very slightly since the world began. Principles are what we seek in military history, and in commending its study to those who strive to become good regimental officers, and to those who are interested in military affairs, I do so in the belief that it will help to enlarge their grasp of military science, and while reminding them that they must ponder over details, will teach them how the knowledge they acquire may most wisely be applied.

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CHAPTER II.

THE ANALOGY BETWEEN THE TACTICS OF ALL THE ARMS.

HAVING then gleaned from military history an appreciation of the principles that bring about success or failure in warfare, students will wish to learn in detail the tactics according to which the various arms may best be turned to account. In the armed forces of our empire we find a very large proportion of infantry and a very small proportion of artillery. To one officer who understands how to handle guns, there are perhaps several hundreds who find no difficulty with a battalion, but regard artillery as somewhat beyond their sphere. Yet guns will furnish the preponderating factor in modern war, and every officer should know how best to utilize them. It is to banish from men's minds the idea that there is any mystery in their tactics that this chapter is written. No officer should feel diffident as to his ability with regard to them, and an infantry officer especially should view them as he does his rifles, that is to say, as machines for delivering fire, the element in warfare which almost a

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century ago Napoleon declared to be everything, and which has gained in importance since he wrote.

I shall say nothing that will come upon any one with startling novelty, nor shall I try to attract attention by any expression of doctrine diverging widely from what everyone has already been taught in the drill-books and manuals which he is expected to study. I believe myself that artillery tactics need be made neither abstruse nor mysterious, and that, in fact, they rest on just the same broad principles that guide us when we handle any arm in war. With purely technical details, such as ranging and ammunition supply, or with questions of gunnery, I do not propose to deal in this chapter. They do not here affect the subject of our discussion. But there are matters connected with the tactics of artillery which are as equally vital to efficiency as these, and which we sometimes find less clearly understood than we might at first expect. Artillery officers are nowadays most properly taught that the tactics of the other arms concern them as nearly as do their own, and that it is only when judiciously applied in combination with them that the fullest results are to be looked for from their fire, however highly from a technical standpoint the efficiency of their batteries may be developed. I am sure too that it will be of assistance to any general study of tactics that we should start from a common basis; and that we should as far as possible allow the same

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consideration to guide us, no matter what particular weapon we happen to pick up. We shall attain such a basis if we regard tactics as simply methods for the application of force—force, that is to say, in the widest meaning of the word, and regarded as an agency by which men are either killed, or wounded, or perhaps only frightened. It is not always necessary to slay or maim a man in order to place him *hors de combat;* the military end is attained just as well if the application of the power you wield is such that he is led to believe that disaster will be his fate should he not quickly either run away or surrender.

Viewed in this way, we can attack with a shower of shells just on the same principle as we launch a charge of cavalry, while there is a very distinct and close analogy between the concentration of fire produced by a volley of musketry and that inherent in a shrapnel shell. In the one case a given number of bullets are discharged in a named direction by the word of command representing the will of a commander; in the other, an equal number are sent on a similar errand also, by direction of an individual, but in this case the command takes a concrete shape and is recorded when a fuze is set.

By way of example, we will suppose that you wish at the commencement of an engagement to check the advance of your enemy's column. If you were unprovided with artillery, you would extend the comparatively few advanced troops on

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the spot along hedge-rows or any other favourable features of the ground, and by their fire bring about the deployment and consequent delay of the closed columns of your opponent. Your object would no doubt thus be attained for a time, but unless your force were very strong, your foe might detach sufficient men to drive away your sharp-shooters, and his main body might be able to disregard your menace and continue its progress undisturbed.

In such a case, however, if you were provided with guns, no minor detachment would suffice to clear the path. Even if only a small portion of the road the foe were advancing along should be visible from a distance of, let us say, a mile and three quarters, a battery commanding that portion could so effectually sweep it that no column could possibly advance until the battery was driven off. The bullets of its shrapnel would be equivalent to the fire of a considerable number of marksmen a little in front of and above the target, and would have the same effect as that of a detachment which, from a secure height above, could command the path through a defile. The distant fire of artillery is here of great value, and enables you to fight a delaying action successfully with a far fewer number of men, and with far less risk to their safety, than would be the case did no guns supplement your efforts.

The same remark holds good, and the same tactics will be effectual, should a rear-guard be in

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question; and when you have guns with you there is not the same need to leave foot-soldiers dangerously far behind the main body in a situation from which it may not be easy for them to extricate themselves, because from a safe distance in rear guns will produce the same effect as rifles will at less secure ranges.

But guns may be utilized to supplement or replace the other arms in other situations besides these.

I dare say many people, when they hear of reconnaissances undertaken for the purpose of obtaining information, have visions of light cavalry scouts, or quickly moving patrols, supported perhaps by comparatively large formed bodies, with even some mounted infantry and a few machine guns thrown in.

But similar detachments to these will, if your adversary be capable, appear on his side to oppose any prying intruders from your direction, and very soon you will know no more than that the advanced troops of your opponent are on the alert, and your explorations will come to a standstill.

In such a case you must exert a certain amount of force to rend the curtain which is drawn before your eyes. Should you send forward a body of men strong enough to brush resistance aside, it may be overwhelmed and cut off, your purpose will be frustrated, while a bad moral effect will be produced on the rest of your command.

Or your advanced troops may become involved

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in a struggle which will be waged stubbornly until you are compelled to intervene with a reserve force, and finally the combat may deepen insensibly until all at once you may find yourself committed to an action on a larger scale altogether than what you originally intended. To obviate such difficulties you should here again make shells do the work from a perfectly safe distance, to accomplish which you would have to thrust squadrons so deeply into the hostile territory that their retreat might become compromised.

Moreover, a small wood or coppice, a group of farm buildings, a little hamlet, or a walled enclosure, may prove impenetrable to horsemen, and once inside it may be difficult to get men on foot out. An ordinary brickwork wall, however, offers no resistance whatever to the progress of a shrapnel shell, and indeed the back of such a deceptive shelter is just the most dangerous position anyone could well be in when opposed to such fire.

In all the above cases there is no more effectual searcher than one of these projectiles; they will explore for you more thoroughly and at less cost than anything else, and you will incur no risks either when adopting them.

Finally, even if your foe has guns to support him, he will probably not unlimber them until yours are brought to bear. When, therefore, you can utilize artillery in reconnaissance you have a sure means for discovering whether your opponent possesses any similar support or not.

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In advanced guard work, in retreat, or in reconnaissance, therefore, the principles which should guide you in the handling of your guns are precisely the same as those which underlie the method which you apply to the rest of your force. You substitute shells for flesh and blood, economize your resources, and run as few risks as possible when you call in their aid to supplement the efforts of the other arms.

But let us suppose that these preliminary skirmishes are over, and that two forces have brought one another finally to bay, and are extended opposite to one another's guns, grim with the resolution to fight it out.

Clearly the most cursory study of tactics will teach you that the first thing a general must do is to reconnoitre the front of his opponent, observe the disposition of his troops, and formulate a plan of attack from the information which he thus gains.

Now, he will do this most effectively by opening fire along his front, perhaps, however, with only a portion of his force, and tempting the enemy's guns to reply to his cannonade. When he is aware where the hostile artillery is, he already knows a good deal, and can arrange his method of attack accordingly.

And if we examine the manner of Napoleon's attack, we shall find that he, who utilized his guns to the fullest possible extent, commenced an action with them in the very fashion I am pointing out. "He begins with a pretty general

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cannonade all along his front, and then when he has made up his mind where his blow is to fall concentrates his batteries against the selected spot." That is how Wellington once described his rival's method, and that really is the origin of the "artillery duel" of which we have heard so much during the years of comparative peace which have succeeded the campaign of 1870. Of course, I recognize that the enhanced power of modern artillery necessitates such a duel in any case, because until the fire of the defence is subdued neither your infantry nor artillery can advance to decisive ranges; but apart from this there is the other explanation of its origin.

Having then with your guns, or with some of them, threatened the enemy all along his line, and endeavoured to mislead him as to your ultimate goal, you proceed to the carrying out of the great object with which you bring artillery into the field—namely, to prepare the way for the infantry attack. But the manner of your procedure now differs from what it was earlier in the day, when, your methods being merely tentative, ammunition was carefully husbanded, fire was slow, and ranges were "distant," that is to say, of more than 2500 yards.

The batteries, we may now assume, have all arrived; the general has, at any rate, the outline of a scheme mapped out; he has learnt something as to the enemy's position, and he wants to begin to develop his plan. Before anything decisive can be

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done, however, it is necessary that batteries must move into a closer range, where observation can be accurate and the effect of fire consequently greater.

Is it not an elementary principle of strategy and tactics alike that you must not expose portions of your force to destruction in detail, and do we not all recognize the value of suddenly throwing your whole strength, or as much of it as you can spare, on the divided forces of your foe successively? Is not that how Napoleon almost won the campaign of 1814, when, occupying a position on interior lines, by swift movement he was enabled to strike to right and left on opponents unable to unite to meet his blow? Now, the destructive power of modern guns in position awaiting an attack endows them with an advantage analogous to that conferred in strategy by interior lines. If the batteries of the attack straggle up into position one after the other, a converging fire of overwhelming weight can be turned upon them; and, since very likely the ranges of the sites they occupy has been previously gauged by the defence, they are thus exposed to the danger of being wiped out in detail by a rapid fire. To avoid such a catastrophe, and also (a by no means minor consideration) because a bold, sudden, and simultaneous display of force carries an immense moral effect with it whatever the arm may be which is involved, we have striven of late to teach our batteries to make their advance and subsequent appearance as far as may be simultaneously. And let

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me here add a word to the effect that, although we are happily no longer wedded to pedantries of drill, there are certain points to which great attention must always be paid, and which we must never despise. And one of these is the matter of intervals. Close attention to intervals is necessary even in manœuvre, and it is impossible for batteries to make a simultaneous appearance, or rather open fire simultaneously, if the first guns to arrive are allowed to absorb all the room. It has happened at Okehampton that, when on one occasion three batteries tried to get into position, one was absolutely crowded out, and could not find a footing at all! Conceive the state of things that would have supervened had those batteries been under the fire of a capable opponent waiting, and prepared for them! Imagine the confusion; the guns being run to one side, or even limbered up over again; the vexation, the delay, the complete upheaval of all the ranging process already in course of progress in some batteries, and picture to yourselves what would happen were all this taking place under a shower of shrapnel bullets! A brigade division thus coming into touch with an enemy will feel a loss of prestige and confidence such as it would be difficult to recover from for weeks and months.

In war it might be a question not of three batteries finding room, but of nine or ten or twelve having to do so.

That is why, when more than one division is

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engaged, it is usually necessary to take batteries away from the divisional commander and employ them all at the will of the supreme leader. Otherwise a position intended for a large mass might be seized upon by one of the divisional artilleries and utilized without regard to the interests of the whole force.

The distance to which batteries should advance must be left very greatly to circumstances. The point will be dealt with again in a subsequent chapter, but I may here say that in a rolling country, such as that where the manœuvres took place in 1893, the move would have usually to be from one crest line on to the next. We should, however, strive to get into position for the second time somewhere short of 1500 yards from the enemy's position.

We have now to consider how best the fire of the batteries may be directed after they have found the range. It is more or less an innovation in our Service to allow a man to attempt to direct the fire of more than one battery in action. Until a few years ago the battery was the be-all and end-all of artillery efficiency, and the doctrine is even now dying hard. So narrow and limited a view may have suited a period when a battery's range was so short that it could only fire at an objective which stood immediately opposite to it. But military history has taught us that, no matter with what arms battle is joined, the surest road to victory lies in demonstrating all along the hostile line, and then

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concentrating an overwhelming force on successive portions of it. And the principle should guide our action where guns are concerned, as surely as it exerts its influence where bodies of troops, or even ships, are involved. On paper it does not seem feasible to allow hostile guns to play upon us absolutely undisturbed; nor could one entirely neglect them, were they making excellent practice; but again the records of war somehow belie the anticipations of peace-time, and it will probably be possible to concentrate the fire of three batteries on one of your opponents in future war as much as it was for the Germans to do so in 1870. Moreover, it would not be necessary to do more than concentrate fire in the way I have mentioned for more than brief intervals. Modern shrapnel, if the range be at all correctly found, will very soon assert its power, and I believe these successive concentrations will occur like sudden squalls, or *rafales*, as Langlois calls them, in the monotony of the general cannonade. Indeed, the same French authority has likened such swift outbursts to the attacks of squadrons, and has spoken of them as "charges" of shells. So far, therefore, we are able to recognize in the employment of artillery very much the same principles which guide a general in handling the rest of his force in action.

He reconnoitres with a portion of it in front of his main body, he utilizes the retaining and delaying power of his guns in advanced or rear-guard affairs; then having found his foe drawn up to

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receive him, he feels and explores the whole of his front until he has formed his plans, when he attacks decisively, and concentrates his energies on successive portions of the hostile line, just as Nelson endeavoured to destroy portions of the enemy's fleet in detail, or Napoleon strove for the same results on land.

But during the progress of so much of the fight as we have now considered, eventualities may arise which may open up opportunities for, or the movements of the foe may necessitate, the display of more enterprise and activity than is implied in the vision of a long line of guns pounding away in a dogged and more or less lethargic fashion.

That is not how all battles have been fought out. A competent leader with well-trained batteries at his command may utilize them to strike a telling blow, to make or repel a flank attack, just as a force of infantry or cavalry may at an auspicious moment suddenly be thrown into the *mêlée*.

At the battle of Bautzen, for example, Napoleon sent Ney to turn the allied right flank, and seize the village of Preititz in rear of their position. Blücher met this movement by detaching twenty guns, which, attacking Ney's columns in flank, forced him to give up the prize which he had succeeded in capturing, swerve from the direction Napoleon had with a true instinct indicated to him, and take up ground from whence he could reply to Blücher's counter-attack. The allies were beaten at Bautzen in the end, it is true, but they

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were not by any means routed; and, had Ney been able to persist in his advance, there is little doubt but that their fate might have been annihilation.

At Salamanca, when Pakenham's division fell on Thomière's flank, and struck the decisive blow of the day, it was the fire of the twelve guns which accompanied it that largely contributed to the French discomfiture.

It was likewise the flank attack of two of our guns on the hostile centre from a point almost inside the Russian position which produced an immediate effect at the Alma. Longstreet, too, at Manassas, struck into the fight with twelve guns in a manner which was also most effectual; and, indeed, examples might be multiplied to weariness to illustrate the principle I contend for.

But, it may be asked, can these things be done again, and will it ever be possible to shift batteries from one part of the fight to another under the fire of modern rifles and artillery?

Well, we shall know more on this point after we have seen an European war; but Hoffbauer tells us that it was possible for the German batteries to limber up and move under fire even to a flank during the battles on the Moselle. I believe that certainly at ranges not less than 1800 yards they will usually be able to do so again, that is to say if the configuration of the ground helps them at all, and we may look forward to seeing an enterprising leader utilizing the mobility of his guns on future

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battle-fields just as the great masters turned it to account in bygone times.

We must remember that although the power of fire-arms has increased so immensely of late, the argument founded on their deadliness cuts both ways. It is not, in fact, unfair to assume that the infantrymen will be so much absorbed in shooting at one another that they may well be taken a little by surprise if a favourably placed battery suddenly limbers up and withdraws. It has been found that the teams need not be exposed for more than about a minute and a quarter during this operation, and at a range of 1800 yards, or even considerably less, it would not be very easy for infantry to do much harm in that time, unless it were prepared for what was going to happen, and knew where to look for it. Of course, however, if opposing batteries had accurately found the range, to thus expose teams would be extremely rash. But on such occasions the attempt would not be made until the hostile fire had been got under.

We know from military history that the records of the battle-field have, however, over and over again given the lie to theories based on deductions culled in peace-time, either from manœuvres or practice ground; and, therefore, we need not be deterred by gloomy anticipations from the determination to attempt to avail ourselves in the next war of all the mobility which is a distinguishing characteristic of modern Field Artillery.

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The work in which the guns have up to now been engaged has chiefly been, my readers will have noted, the subduing, as far as possible, of the enemy's artillery fire, with a view to our infantry being able to advance to the attack. That may be said to be their primary duty, and the whole character of the fight will be influenced by the manner in which it is performed. It is, therefore, to be regretted that at manœuvres we never, or rarely, see anything like proper time allowed for this preparation to take place, nor is any inquiry made, so far as I know, as to what has been the result of what is mainly an artillery duel.

Although modern guns have shown themselves at target practice so annihilating in their effect that it has been said that the struggle between the rival artilleries must be decided one way or the other in less than half an hour, the lessons of military history point to a different conclusion. The process of ranging a battery is sometimes a long one, and at Okehampton has been known to occupy twenty minutes, although it can usually be accomplished in five. When engaged with an opponent the difficulties would be far greater and the process much slower. It is not every man who can be trusted to set a fuse correctly under fire; indeed, a good soldier once told me he had never met such a man. Our gunners in the Peninsula had a saying that "there is nothing like a round shot." Common shell and percussion fuses have done good work since then, but till we have more

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experience under artillery fire to go upon it is better not to be too sanguine, to study patience, to give the guns time to assert themselves, and hold our hand until they have done so unmistakably. The voice of history has no uncertain sound here, and Torgau, Gujrat, Malvern Hill, St. Privat, and Sedan all illustrate the same truth. Give the guns time.

But, just now, we must go on with the attack, and so we will suppose that our artillery are not absolutely flattened, and that word has been sent to it, or that its leader has seen, that the infantry are about to start on their decisive advance. We will suppose, too, that circumstances during the previous cannonade have helped the general to select a spot where he hopes he may drive home his blow, and that the guns have been told where that spot is.

Now, it is a principle in war that you cannot be too strong at the decisive point; and, therefore, an artillery drill-book only reflects the teaching of an infantry one when it says that the fire of the guns is to be turned upon that point, even though the enemy's guns may still be capable of mischief. Our batteries must risk their own safety, and forget to protect themselves, when their comrades go forward, and must then only consider how they may most surely help them in their task.

They may do so with greater safety than might at first sight appear, because in war, as in all other relations of life, the danger at the moment the most pressing is the one which must

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be faced. In other words, in a *mêlée*, you strike at the opponent who is hurting you, or threatening to hurt you, most; you pay your most pressing creditor first; and you answer an official letter before a private one.

Our own infantry pressing forward to the assault must be checked, or they will carry all before them, and, therefore, the enemy's guns will be so much absorbed with them as a target that they will forget our batteries.

It becomes a question now as to whether the guns of the attack should make yet another advance in close support of the infantry. Supposing you are already in action, within between 1500 and 2000 yards of an enemy's position, and that you can keep up your fire till the very last, it may sometimes be that you will not greatly better the effect of your guns by going forward. The shrapnel shell is so destructive at such ranges as I have indicated, that, so far as killing goes, you might afford to rest content. But there is the closest analogy between an artillery attack carried out by shells, and an infantry assault depending on the bayonet: and if you understand how to carry out the latter, you will appreciate how to find success in the former.

When Napoleon marched a great heavy column upon his opponents, what usually happened? The great mass came on with all the glow of coming triumph upon it. Its resistless, unhesitating strides carried conviction of defeat to the

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minds of those awaiting its onset. Who could withstand such majesty, such a remorseless, unwavering pressure as it seemed to carry with it? The prestige, and pomp, and circumstance surrounding such a charge were enough in themselves to win a victory; rarely or never did the defence, already shaken and demoralized by artillery fire, wait to cross bayonets with that brilliant assault—it broke and fled, practically beaten by moral effect alone.

If the column wavered, and stopped, as at Waterloo, it lost its chance. The defenders recovered their nerve, plied it with fire when all the advantages of ground and formation were in their favour, and thus the attack, checked in the flowing tide of conquest, very likely stagnated and receded.

The great concentration of shells on the point to be assaulted produces its effect much in the same way as did those human projectiles of the great Corsican. The intensity and volume of the fire should grow as the infantry creep nearer, there should be no breaks in its progress, and there should be no cessation just in the last few minutes when the infantry is about to make its final rush. Otherwise the defenders may have time to recover themselves, and the little space of breathing time allowed them may just make the difference between defeat or victory. The artillery fire should, in fact, culminate in a tremendous blast, more powerful than anything yet experienced,

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just at the supreme moment when the infantry are thinking more of their bayonets than of their cartridges.

Now, to keep up such a continuous stream of fire as I have pictured may on average ground often be impossible, unless the guns can push in as the infantry presses on. To fire over men's heads is a ticklish job, and an accident or two may produce a very bad effect. Moreover, unless the configuration of the ground be ideally well suited to the operation, it will almost always happen that the final advances of the infantry will mask the fire of the guns. For two good reasons, therefore, the guns may have to go forward; and there is a third which is, perhaps, the most cogent of all, and which will appeal to everyone, because it applies to all arms.

What I mean is that immense moral effect will be imparted, and an impetus given to a wavering attack, if guns go ahead and make their voices heard well to the front.

We must make up our minds, therefore, that if for any of these reasons an attempt to go forward is demanded from our batteries, the certain destruction, to our horses at any rate, which will apparently await them, is not to weaken our resolve.

In the event of a success not of an overwhelming character when the foe has not been absolutely routed and dispersed in a demoralized flight, it would further be necessary to send guns

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forward to the position just evacuated by him, so as to ward off any attempt to make that counter-attack which, after the first panic was over, he might feel himself sufficiently re-organized to contemplate.

In the excitement of the last moments of an assault, however, it would not, I think, be possible to hold the infantry battalions charging forward so completely in hand that they might not spread out over the captured position in a manner which might leave little space for the supporting batteries to come up. Moreover, if the foe were at all capable of rallying, the loss inflicted on the teams of the accompanying batteries might be heavier than would justify the sacrifice involved.

It is for this reason that the French have thought of a manœuvre which it is hoped will be equally effective, and which may be carried out at a less exorbitant cost. They propose to send horse artillery batteries forward on the flank of the infantry assault at the same time as it is launched, and since their advance will be timed for a moment when the hostile musketry will be somewhat subdued, and when the energies of the enemy will be devoted to the defeat of the infantry, it is hoped that celerity of movement will enable them to get into action without serious losses. Fire from a flank is also far more effective than any other, and in this respect, therefore, the French scheme seems an advantageous one.

As we have thus accompanied the guns of an

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attack right up into the enemy's stronghold, I may mention a few facts about the defence which are of interest.

To a large extent, the rules which guide us are corollaries in an opposite direction from any hints I have already given. That is to say that, when the foe is using his guns to reconnoitre your position, it is well not to show him all your hand, if you can avoid it. Guns well placed are not easy to see until they commence to fire, and, therefore, an effort should be made on the defensive to reply with as few guns as possible to his first attack at long range. At the same time, however, we must remember that a defensive attitude usually implies inferiority, and that we want to delay the enemy's attack as long as possible. If only we can sufficiently do so, the hours of daylight left when it is finally developed may not suffice to carry it through to its conclusion.

As regards the places most suitable for guns on the defensive, they should naturally be placed where they can best sweep the approaches along which the hostile columns must advance, and the protection of flanks would likewise fall to the arm which is most capable of fire effect.

It is the advantage of the attack, whether guns or men are for the moment in our thoughts, that a concentration against any point of the defensive line may be arranged for. When on the defensive with guns as with rifles you must be

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prepared all along your front, must therefore distribute your forces more equally along it, and cannot aim at massing guns as you would were you the assailant. On the other hand, the batteries which await attack should be able to fall on their opponents in detail, as they come up.

When discussing the advantages of attack and defence with reference to tactics in general we attribute, and rightly, a great moral value to the former. In the case of guns the moral factor has less influence, I think, than where men only are concerned; and another principle, applicable to both infantry and artillery, affects them when in attack more seriously, perhaps, than it does their brethren. We are taught that both guns and riflemen must make cover subordinate to effective fire. The consideration is to be fire effect—not your own vulnerability. It is for this reason that batteries coming into action often present a tempting target. The command of a gun is only about three feet, and from a point so near the ground as that a very slight inequality will hide considerable stretches in front which will be unswept by fire unless you push guns further down the slope than often appears judicious to lookers-on. The guns of the defence can be better covered and can make use of gun pits, and, moreover, can be provided beforehand with the ranges of the places which will most probably be occupied by the hostile batteries.

Undoubtedly, if theoretical argument is paid

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attention to, the advantage must lie with the defence. There is this, however, to be said about all such prognostications, whether they apply to guns or infantry, namely, that during periods of peace opinion has always tended to appreciate the power of the defence; and yet in war, in spite of many brilliant examples to the contrary which our Army has given the world, it is the attack which has most often carried the day, whatever the tactics or weapons fought with may have been.

Again, there occasionally may occur a moment during the progress of an action when the artillery on the defensive is forced to realize that, do what it will, it cannot cope with the guns of the attack, and that, if the contest be continued, it will infallibly be destroyed altogether. Now, in a parallel case where battalions were concerned, what would be done? They might be withdrawn and kept under cover only to emerge when the assault was upon them, and then devote the whole of their refreshed energies to pouring in such a fire as might check their foes.

The Turks acted in this way at Plevna. During the cannonade which heralded the approach of the Russians, they cowered beneath their parapets; these were but little injured, as is the case usually when earthworks are played upon by guns, and the enormous preponderance of artillery which the Russians could boast of (they had some four

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hundred guns against sixty) did but small destruction either to men or entrenchments. When the near approach of the infantry masked the fire of the artillery, the Turks left their secure hiding-places and lined the parapets with rows of rifles, but little the worse either in number or in *moral* for the furious storm which had raged harmlessly over their heads. The preparation of the Russian assault had, in point of fact, failed in its object, and their attacks were consequently repulsed.

Now, the same tactics may be adopted in the case of Field Artillery also. It would not be usually necessary, however, to withdraw the guns themselves. We are told to do so in the drill-book, I know, but those instructions have, I believe, more particular reference to occasions when a regular refit may be required. The guns will be hardly injured at all by shrapnel bullets, and the moral effect on the adjacent troops of removing them might be bad. I think, therefore, it will often be enough merely to take the detachments away, and make them lie down under cover until the enemy's infantry move forward.

When that moment arrives the guns must fire on that infantry, though every man with them be destroyed in the attempt. But even a very much superior artillery will find it a protracted and not very easy task to annihilate the whole of the gun detachments before considerable damage has been done. For short periods of time and at

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decisive ranges four men can work a gun very well—three can do it at a pinch—and you need not, therefore, expose all your men to destruction at the same time, but they can be called from under cover as casualties occur.

Here, perhaps, I should note that it is only under these circumstances that there is any analogy as regards reserves between artillery, infantry, and cavalry tactics. Speaking generally, there is indeed a very striking difference in this respect between them, because modern artillerymen are taught that they are not to hold any part of their force in reserve at all. Every gun we have is put into the fight from the very first moment that it is possible to do so; the reason being that their long range enables them to be usefully employed from the very beginning, and that you should try and establish a superiority in fire as early in the day as possible, so as to be able to bring your infantry forward.

There remains only one other aspect of artillery tactics to be considered, wherein of late the principles of its employment have been made to closely approximate to those of the other arms.

It is perhaps the most elementary principle of warfare that scouts and patrols should be sent ahead and to the flanks of main bodies to secure them against surprise, and to bring them back information about the enemy.

In addition to these patrols, cavalry send

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ground scouts ahead of their squadrons to examine the ground over which it is intended to move, and to signal any pitfalls or difficulties which may menace rapid progress.

Now, batteries have just as much need for such information as have cavalry or foot-soldiers. It is even more essential to them that they should know where they may safely penetrate, because the consequences of a waggon or gun being bogged or upset are more serious than when a similar disaster overtakes a rider.

Further, it is a certainty that no one will look after your safety so well as you are likely to do yourself, and for batteries to depend on outside assistance only for what they may do to a large extent for themselves is a mistake.

With a Horse Artillery battery there would usually be no difficulty in finding a few men for these duties. With field batteries it is not so easy to spare men from the guns, but there are some spare horses almost always available; and young non-commissioned officers, the shoeing smiths, the farrier, and the second trumpeter can occasionally be pressed into the service. It is, of course, not to be hoped that such men will make ideal scouts, but neither is it in human nature for a cavalry colonel to send his best men away from his squadrons—so that with careful training a battery relying on the eyesight and intelligence of men not originally enlisted for such duties as more legitimately fall to cavalrymen may find its

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security perfectly well provided for in the way I have described.

General Tyler, who has tried the plan in practice camps in India, is strongly in favour of a system by which these scouting duties should be pushed to the fullest extent, and by which men should be sent ahead to report on positions for guns, and the facilities or difficulties which may exist in an approach to them. The ground scouting he considers may be left to the Nos. 1 and section officers, while what are called in our drill-book, "Patrols," would be occupied in duties which, more strictly speaking, belong to reconnaissance work, as far at least as might be consistent with a close and unremitting attention to observations of, and look out for, the enemy.

Such scouts were ordered at his experiments not to proceed more than a mile from the batteries in any direction in an open, and not more than half a mile in a close, country, and were always to preserve touch with them.

They were to keep their eyes and wits about them, and note everything relating to the enemy as regards the disposition of his troops, particularly with regard to woods, villages, hills, or rivers. I should say that these should form their principal duties on service, but at a practice camp they were told to devote their attention most especially towards obtaining information as to how batteries might best advance in a given direction, whether cultivated or rough ground must be passed over or

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not, and as to where they would find the best positions from which to carry out the tasks assigned to them.

These scouts were further instructed to make a sketch of the ground, making the N. point, showing all necessary details, and accompanied by notes supplementing the pencil work. On home service the difficulty would be to get the time and men for instruction in such duties, but there is no doubt that to train men in this way, if opportunity offered, would be an immense benefit all round, both to the men themselves and to the batteries whom they serve, in so far that it would greatly develop their powers of observation and intelligence. Commanding officers would get information from men who thoroughly appreciated and were in sympathy with the special needs and characteristics of the arm whose interests they were looking after, while the men themselves would be none the less efficient as gunners or artificers, because their intelligence and powers of observation had been developed by training such as General Tyler has described. And when finally battle was joined and many batteries were together in position, the habits they had acquired and the practice they had had would no doubt render them especially valuable as messengers and links of communication between the various units that go to compose and keep in full work a mass of guns.

In conclusion, let me indicate one final and

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culminating phase in the action when the same principles once again govern the application of all three arms. Perhaps when my readers hear or read of the pursuit being launched after a beaten foe, and of the necessity there is for pitilessly harassing the vanquished until retreat may become converted into rout, and defeat develop into demoralization and disaster, I dare say some picture in their minds squadrons hotly pressing on, furious pursuit with the bayonet, and the *arme blanche* once more asserting its old supremacy. Doubtless such sights will be seen on the battle-fields of the future, but there may be, and I believe should be, another element in the inundation. Shells pursue more swiftly and relentlessly than even the very fleetest cavalry, and artillery fire should play its part in the demoralization of the flying enemy in quite as marked a degree as do either horse or foot.

All the guns that can possibly be moved should be hurried to the ground evacuated by the foe, and a fierce and continuous rain of projectiles be poured on his retreat by every battery that can be brought to bear.

The great range of modern guns will enable the swift shells to follow and overtake the most reckless runaways in their most headlong flight. The roads which lead from the position may often be swept for hundreds of yards along their length by these same persistent, remorseless, inevitable destroyers. Whole miles of waggons and guns

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may have to be abandoned under their all-powerful influence, and the huddled crowds of fugitives have to disperse and seek shelter in the fields on either side. Guns can pursue, therefore, by means of their fire, just as the other arms do by a greater exertion of the sinews and muscles of man or beast, and we merely substitute one agency for another when we employ all the arms on the same principle to attain the same end.

I hardly think the subject of pursuit by means of fire has hitherto received all the attention it should have met with at the hands of military writers in this country.

I commend it to notice now, and I hope I fitly bring this chapter to a conclusion when I leave horse, foot, and artillery co-operating, and striving together to shatter and irretrievably ruin an opponent whose defeat has been compassed by their loyal combination during the previous hours of a hard-fought fight.

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CHAPTER III.

THE DISTRIBUTION OF GUNS.

It is well that I should now examine the organization of Artillery in the field, because the principles which have brought it about are not always understood, except by those who have made a study of Artillery. An Infantry divisional general, even in these days, is occasionally recalcitrant when his guns are removed from his command on the field at manœuvres, and cannot understand why, if his guns are termed "divisional," they cannot be always left to act with the unit to which they belong. In our service the tradition has been handed down that guns fight in conformity with the infantry, and no great recent war has reminded us how much the invention of rifling cannon has modified the relationship between the two arms. Yet, if military history has been studied up to date, no reader can have failed to note the vast change that has been brought about in the handling of Artillery since the great war of 1870. The idea of "a service of detachments," as the Duke of Wellington once described our Artillery as being, has been for ever swept away, and, indeed, there is no

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feature of modern tactics more distinctive than that which characterizes its modern application. For Artillery alone of the three arms can claim to be able to dispense with a tactical reserve, and it is in its bold disregard of what is a necessity to Infantry and Cavalry that the arm has most markedly shown its independence. I say "can claim" advisedly, for the triumphs of the German batteries in 1870 have surely supplied a solid foundation to such pretensions. There were several battles of that war in which the whole of the German batteries were not all engaged, and several in which some batteries fired but very little. But that was due to want of space alone. It may be that where armaments are more equal on both sides the boldness which distinguished the batteries of the victors in that momentous campaign may be found unjustifiable. It is certainly true that we are going upon the results of a single campaign; but until the lessons of twenty-eight years ago are contradicted, we must largely be governed by their teaching. Nor can it be doubted that this new spirit of independence is an admirable one. It shows, at any rate, that gunners are more anxious than ever to be closely allied to their brethren of the Infantry and Cavalry, and that they chafe at any restrictions or organizations which may tend to hold them aloof. It is a soldier-like instinct which makes all the guns want to go into the fight early, and stay in it to the very end—*if they can.*

Of course, however, zeal and enthusiasm will not

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alone suffice to bring such ambitions to a successful issue; quickness and skill in selecting sites adequate to a large mass of guns will be required, if all the guns are to find room, and good dispositions on the march if they are to arrive in time. Improvements in *matériel* were also needed to give substance to the dreams of enthusiasm, and they have certainly supplied a reasonable basis to what might otherwise have remained an impracticable aspiration only. But now that targets and percentages have yielded tangible proof of the capabilities of modern guns, it is recognized that they are too useful to be wasted standing idly in rear, and their eagerness has been gratified.

As is, however, usual in military matters, improvements and innovations have been a long time in asserting their influence. As lately as 1866, the Austrian Army of the North, though all its guns were rifled, held a reserve in hand of 16 batteries, or 128 guns, and it was the Artillery Reserve on the same side which earned so splendid a reputation for itself at the battle of Königgrätz. On the Prussian side, too, we find an Artillery Reserve of 16 batteries with the 1st Army commanded by Prince Frederick Charles.

Nor even in 1870 was the new principle universally accepted. After 1866, the Germans, it is true, modified their views on Artillery tactics considerably, and none of their guns were deliberately held in reserve when they overran France four years later. But when we turn to the French, we find not only that the changes in tactics necessitated

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or rendered desirable by improvements in the ballistic powers of modern field-guns had not been appreciated, but that the Army of the Rhine followed old traditions in forming 96 guns into a reserve.

The experiences of the French in 1870, and of the victors in 1866, were, however, scarcely calculated to provoke imitation as regards Artillery tactics, and since 1870 there has been an universal tendency to altogether dispense with a reserve for Artillery. At first sight it seems plausible to argue that to hold a reserve in hand when you join battle is a first principle of tactics, and that Artillery can claim no immunity from the destruction which wastes the other arms. I am far from denying that there is a substratum of truth in the contention, but after all it does not furnish an unanswerable argument. Both Infantry and Cavalry utilize reserves and secondary lines to rally and give cohesion to troops worn out by a prolonged strain, or perhaps disorganized in the moment of success. It is also undoubtedly necessary to keep a force in hand ready o deal with any sudden emergency or new development of the battle. But losses do not affect Artillery so greatly as other troops. It can, so to speak, lose more blood without being perceptibly weakened than can they. For even if a battery were to lose half its strength, its fire effect would not be greatly diminished. The guns may be worked by reduced numbers, and are themselves none the worse for being hit. Moreover, they form

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a solid framework round which men preserve confidence and steadiness, and each supplies a rallying point while it remains in position.

As to the sudden emergencies to meet which a body of troops is usually kept intact, batteries engage the enemy at such considerable range nowadays, and are possessed of so much mobility, that many think it will often be possible to withdraw them from one position during the progress of an action and throw them into the fight somewhere else if necessary. I wish to do all homage to the destructive effect of modern shrapnel, but I have already shown that flank marches of Artillery were found possible under fire in 1870, and Prince Kraft gives us more than one example of similar tactics from his experiences at the battle of Sedan.

But it may be objected that, if the destructive effect of Artillery fire is to be as great in the future as I believe it will be, batteries will be so mauled during the Artillery duel that they will be unable to fight again until resuscitated from some reserve which has been carefully nursed with this end in view. I reply that the ammunition columns can do much towards replacing casualties and refitting, that in any case when you are going into battle you must make up your mind to win it at all hazards, and that no misgivings as to the future must blunt the edge of your stroke. If you lose your first battle, you will leave all the batteries which have suffered heavily in men and horses behind you on

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the field, you will lose your prestige, and you may lose the campaign. If, on the other hand, you win it, the chances are that you will capture horses from the enemy which will replace wagon horses that may have been passed on to the guns. Your guns will be none the worse for the bullets they have received, and the detachments, if they have been economically used, and only those numbers actually necessary for working the gun have been exposed to fire, will not in all probability have suffered more losses than can be made good by calling in from the wagons men who have not been engaged. The ammunition columns of the German Guard Corps gave 200 horses to the batteries after St. Privat. Von Dresky, after he had lost 75 per cent. of his horses at Vionville, successfully made a similar call on his wagons, for we certainly find him in action two days later at Gravelotte; and at this last battle Hoffbauer tells us how one of the German batteries, which had suffered very severely, requisitioned ten cart-horses from a neighbouring farm, and was thus enabled to appear in the firing line again a few hours later.

The strongest argument of all against a reserve for Artillery is, however, supplied by the fact that such an organization has almost always led to the guns hanging back so far on the line of march that they were unable to reach the battle-field in time to be of service. There is an ominous ring about the word: it reminds us of the days when guns were regarded as "train," and their detachments,

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and even officers, as artificers; of columns crawling slowly through miry roads, of guns wasted even on the battle-field because no one could handle them.

I wish, however, to guard myself against being misunderstood. I do not mean to say that I believe what practically constitutes a reserve; at any rate, a temporary one is altogether outside our contemplation. In a close country such as England there might not always be room for all the guns to be in line at the same moment, and some might have to stand aside till opportunity offered. It was once suggested to me that I should write about the special tactics Artillery would have to adopt in our own country, but I do not care to contemplate the possibility of an invasion, and I believe the guns will be equal to the occasion when it comes. With very large forces a similar difficulty might arise in any country, and we will do well to remember that eighteen batteries of the German Guard could not find positions at the battle of Sedan. It is also legitimate to doubt whether guns could always fire over one another's heads on active service (which will sometimes be necessary if they are all to be in action simultaneously), as they do at peace manœuvres. Again, when on the defensive it might often be judicious not to display all your strength in guns from the outset, but to hold some back for the crisis of the day.

And, finally, we cannot build up a fixed principle from the experiences of one campaign in which

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the opposing artilleries were by no means evenly matched.

The considerations I have thus slightly sketched, formerly governed the distribution of guns and are reflected in modern organizations by the Divisional and Corps Artilleries. The former to be used in the closest co-operation with Infantry, the latter supposed to lie ready to the grasp of the general commander, and yet to be engaged from the outset in accordance with the notions imbibed from the experiences of 1870.

Moreover, since a sudden development in battle can often only be met by mobility, this Corps Artillery is composed of a proportion of Horse Artillery batteries.

This is the organization which is still universal, but we hear murmurs from some not without authority who demand a more intimate combination of guns with Infantry, and do not see the necessity for retaining a special force of guns unallotted to it.

As I write these lines I note a controversy on this very subject going on in the German Press.

Casting our eyes for a moment backward, we shall find that the origin of a distinction between guns allotted to infantry, and those united to form a reserve, lay largely in a difference of calibre. The battalion guns drawn by hand were necessarily light, were therefore lacking in power, and their fire had to be supplemented by that of the heavier pieces of the reserve. As Artillery became

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endowed with greater mobility the primitive battalion guns disappeared, and divisional artillery organized in batteries took their place. Thus it was that in the vast armies of the First Empire the retention of a portion of the guns as a special force under the hand of the commander-in-chief became unnecessary, and that all the artillery was divided up amongst the various corps.

Napoleon did not, in fact, keep any Army Artillery Reserve in hand at all. Yet no general ever used masses of guns to produce a telling effect more lavishly than did he. But he did it in what was then a new way. If he wanted to strike a special blow, he did not hesitate to seize on the batteries of the Army Corps, which happened to be in reserve, for his purpose, and, since that corps was usually the Guard, it was to the Artillery of the Guard that he tells us he was indebted for his most brilliant successes. In exactly the same way the batteries of the 3rd and 10th German Corps were thrown into the fight on the 18th of August, 1870. No general would refrain from calling forward a brigade or division of Infantry if necessary, and neither need he respect the unity of the Corps where Artillery is concerned.

These tactics of Napoleon's time were the outcome of necessity; rifled cannon had not yet made their appearance on the battle-field, ranges were comparatively short, and fire effect feeble except at very close distances. The guns, therefore, necessarily dispersed amongst brigades and divisions,

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opened the action and co-operated with the attack of the Infantry as far as possible. To prepare the way for a really decisive blow, reinforcements were however, needed, and then the guns hitherto out of action were brought up, within a few hundred yards of their objective, and poured in a very rapid and overpowering fire of case. Case was the only really effective projectile then, and therefore the guns which were to breach the enemy's line had to be grouped close together in front of their objective, and very near to it. It was manifestly hopeless to expect several batteries in position at some distance apart to concentrate their fire when using so feeble a projectile, and mobility was so inadequate, and the distance between lines of battle so small, that it would have been hazardous, if not impossible, to assemble at a selected spot guns originally dispersed along a line of battle. On the other hand, it was then possible to allow a large proportion of guns to stand idle during the earlier hours of a battle, because artillery fire was not deadly beyond case ranges, and to overpower it before the infantry could advance to the assault had not yet become an imperious necessity.

When, however, entering on a struggle for life or death, such as the artillery duel with improved *matériel* soon proved, it was imperative to put forth one's whole strength so as to gain the upper hand, and that, too, if possible, early in the day. Guns could scarcely be deployed for action too quickly, nor could there, if ground permitted, be

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too many of them. Whereas formerly a Napoleon would have relied on his divisional batteries to support and cover the infantry advance, but would have paved the way for their final rush with a mass of guns carefully nursed for that special purpose, a modern general will, it is expected, engage every gun he has from the very beginning, and he will not scruple to send to the front every battery from the corps or division in rear on the line of march. Later on, when it is desirable again to thrust batteries forward to decisive ranges in order to shake the defender's line at the point to be assaulted, no pedantic distinctions between corps and divisional artillery will, I believe, be thought of. In battles *de rencontre* the deployment of divisions subsequently to the opening of the battle by the advance guard will not always place them close to their own guns, and it may well happen that the close support of their assault will fall to the lot of batteries standing nearest to them on the field, but belonging to another division. Again, it is only those batteries, or brigade divisions, which are most capable of movement that will go on, and no one will stay to consider what their precise designation may be.

But if guns are all of the same calibre, come into action as far as possible together, and towards the close of a fight are seized upon indifferently by a general, why unnecessarily complicate organizations by labelling them with different names? There is seemingly more solid common-sense

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about the argument in favour of sub-dividing all the batteries amongst the divisions.

Abroad, where artillery regiments are quartered permanently with the units they will support on the battle-field, the matter has a slightly different aspect to that which it assumes with us. The more intimate the connection between guns and battalions in peace time, the more genial is their co-operation likely to prove in war. A real territorial scheme for all arms, such as exists in France and Germany, is, however, an ideal to which it does not seem that we in England are ever likely to attain. On taking the field, our batteries and battalions will be, and must be, at best, acquaintances, not old friends; during the progress of a campaign, however, a closer and more universal union might undoubtedly be engendered were the course indicated adopted by us.

Other considerations less sentimental and more weighty than those of good fellowship plead also eloquently for it. On the line of march the Corps Artillery will often introduce an element of uncertainty. If the corps is moving on two or three roads, on which is that body to be? Is it always to be foreseen which column may stumble first on the foe, or may receive his blow? And if not, may not one force of infantry have too many guns and another too few? If the corps move on one road, all the artillery, we may assume, will march towards the head of the column, but in that case,

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when deployed, corps and divisional guns will stand side by side in the line of battle, organization being more or less disregarded.

Nor do I think that, if we briefly glance at a few of the battles of the war of 1870, we shall find those refinements in the applications of corps and divisional artillery, which we might be led to expect from the theoretical teaching we plod through in the text-books. It has been contended that at Spicheren the 14th German Division would have found its task a less arduous one had its infantry brigades been supported by half the batteries of the Corps Artillery in addition to its own. Owing to the separation of six batteries to form that unit they had, as it was, to draw on two other army corps for support in artillery, and the guns, which were supposed to be at hand to sustain the fight at critical moments, were too far away to be of any service to their comrades.

At Colombey the 13th Infantry Division was placed in much the same difficult position as its fellow division had been in at Spicheren, and, had all the guns of the corps been allotted to the divisions, reinforcements which were much needed would have been earlier at hand. The Corps Artillery was on that day too far to the rear on the column of march, the field artillery portion of it never got into action at all, and its two horse artillery batteries are to be found south-west of Noisseville with the corps artillery of the 1st Corps. On that day, therefore, Corps Artillery

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can scarcely be said to have lent much assistance to its comrades. There is, in fact, a danger lurking round a system which even nominally tends to hold guns aloof from the other arms, and it is probable that the ideas of 1866 had not been wholly purged from the minds of German generals in these first battles of the 1870 campaign.

I will admit that if we turn to the battle of Wörth, a fight conspicuous for the vast mass of guns brought into action by the victors, we find the batteries all deployed early in the day, and the Corps Artillery may perhaps claim here to have formed a *point d'appui* for the remainder to form on. But the tactics of the German batteries later on in the battle have been adversely criticized, and I shall myself in a subsequent chapter have something unfavourable to say about them. It is asserted that they hung back needlessly, and that when the Infantry were crying out for a closer support from them they did not push on to lend their aid with that generous recklessness which distinguished their action in some subsequent battles. There was rather too much "Corps Artillery"—something of the notion of holding aloof in reserve—about their handling.

But even when the bonds were broken and batteries were sent forward, what do we find? Is the Corps Artillery sent on as one unit under the hand of the commander-in-chief in the fashion we may describe as orthodox? Not at all so. Distinction disappeared under the stress of action and

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the force of circumstances, and the Corps Artillery batteries were divided. Let us listen to the official account:—"It was above all things necessary to re-open the artillery fire, which had been masked by the advance of the infantry on the west bank (of the Sauer). The batteries of the 10th Division and *half* the Corps Artillery crossed the Wörth bridge, which had been restored by the pontoon company, and endeavoured to make their way through the blockaded streets. The artillery of the 9th Division, the 3rd Light and the two Horse Artillery batteries of the Corps Artillery, escorted by a company of the 6th Regiment, advanced as far as the Wörth-Görsdorf road; the line of guns was subsequently reinforced by batteries of the 1st Bavarian Corps."

Surely it may fairly be argued from such experiences that no peculiar advantages were derived from the organization of a special body of Corps Artillery on this occasion, but rather that, had the batteries all been part and parcel of the divisions, they would probably have been in more intimate co-operation with their comrades? Later on, too, towards the close of the fight, we again read in the official account that "five batteries of the 5th Corps were intermingled with the line of guns of the 11th Corps." A footnote tells us that those five batteries were the 4th, 5th, and 6th Light, and the 5th and 6th Heavy. Again, a reference to the "order of battle" of the German armies shows us that four of these formed the Divisional

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Artillery of the 10th Infantry Division, while the 4th Light battery belonged to the Corps Artillery. The remaining two heavy batteries of the Corps Artillery of the 5th Corps did not come into action again when the remainder pushed on towards Elsasshausen.

It may perhaps be contended that this disintegrating process must always go on during a fight, and that batteries must get into position how and where they may; but if that be the case, as I believe it is, why not recognize the fact at once, and cease from importing a certain obstructive element to the free and liberal application of guns by making nice distinctions which are more likely than not to be forgotten on active service?

I believe a careful examination of the exact movements of the 11th Corps at Wörth will also show that the organization I am discussing rather hampered than assisted their co-operation with the infantry: that, as the battle deepened, batteries pushed their way on singly, and that it was found impracticable to insist on any distinction between those allotted to divisional, or Corps Artillery. The existence of a Corps Artillery tended indeed in this case specially to draw batteries away from their divisions to form a great mass of guns, but it is only fair to add that this has been attributed to the fact that the officer in command of the Corps Artillery had during peace time been in command of those belonging to divisions. Thus these latter rather looked to him for orders than to the

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general under whose command they had been placed on mobilization. It has been said, too, that the divisional generals were out of touch with their batteries, and were somewhat tardy in sending them orders, a danger which we are especially open to in our army.

Now let me turn for a moment to Vionville, a battle of a particularly impromptu type. I do not think we shall here be able to discover any distinction whatever between the manner in which corps and divisional batteries were employed. When guns were needed, Von Alvensleben did not stay to consider under what nomenclature they might figure on paper. Nor would any one but a pedant do so under similar circumstances. Whatever could move was sent on to support the troops already engaged, and to grip the French more tightly.

Thus the guns of the 6th Infantry Division were seized upon by him without the least compunction or ceremony, and they were sent ahead just as were the Corps Artillery batteries over which he had a more legitimate control. No one will cavil at his action, but what I cannot help observing is, that had there been originally no specially formed Corps Artillery, the 5th Division would have been more powerfully supported by guns in its hour of need, and that the Divisional Artillery of the 6th Corps would have been pushed boldly forward by the commander-in-chief as, in fact, it was.

It is indeed extremely interesting to note how

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on this day the force of circumstances again dissipated the arrangements and theories which read plausibly enough on paper, and might even have been carried out in the orthodox fashion during field-days or manœuvres. Corps Artillery, we are taught, is a special body to be held together for a particular purpose. It is organized under a distinct commander and has a separate staff. It is theoretically always ready for the grasp of the commander-in-chief, and is to be a weighty weapon for his use alone. Now if any one will take the map of the battle of Vionville attached to the German official account, where the positions of all the various bodies of troops are shown between 4 and 5 p.m. on the 16th of August, he can hardly fail to be astonished to find how little the schemes of the drill-book withstood the exigencies of a critical battle. He will see corps and divisional guns intermingled together, and that, too, not only with batteries belonging to their own, but with those of other Army Corps. The integrity of the body set apart for the particular purposes of the Corps leader is in nowise respected.

Let me take the batteries of the Corps Artillery of the 3rd Corps. They were the 1st and 2nd Horse Artillery batteries of the 3rd Field Artillery Regiment, and the 3rd and 4th Heavy and the 3rd and 4th Light batteries of the same unit. A reference to the map will show us the two Horse Artillery batteries standing separated from one another in the great line of guns to the south-east

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of Flavigny, the 3rd Heavy field battery forms one of the same mass, but the rest are far away. One, the 3rd Light Field battery, is part of a group of batteries on the north-west of Vionville, none of which belonged to the same corps as itself, while the 4th Light and 4th Heavy Field batteries are quite by themselves, as far as artillery is concerned, a little to the north-east of Vionville. The Corps Artillery of the 3rd Corps is therefore completely scattered and dissolved in the general fight, and there is no pretence whatever of its waiting for the beck and call of its Corps Commander.

And the positions of the batteries that constituted the Corps Artillery of the 10th Corps reveal a very similar state of things.

This body was composed of the 1st and 3rd Horse Artillery batteries of the 10th Field Artillery Regiment, and the 5th and 6th Heavy, and 5th and 6th Light batteries of the same unit. Referring once more to the map of the official account I find the 1st Horse Artillery battery forming part of a group of guns a little on the north-west of Vionville, the 3rd Horse Artillery battery placed amid the mass of artillery on the south-east of Flavigny, the 5th Heavy amongst the batteries which prolonged this line on the other side of the road, the 6th Heavy is one of the four batteries which were posted still further to the south-east on a low hill, while the 5th and 6th Light batteries are discovered on the west of the Tronville copses some 3000 yards away to the

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west of Vionville. If I were to closely examine in a similar manner the exact movements of the various Corps Artillery batteries at Gravelotte, I should find them more united, but there would be equal difficulty in recognizing the advantages that are claimed for their organization as a special unit, and it would be evident that there was but little distinction between the method in which they and those of the divisional artillery were handled.

My enquiry has so far been confined to offensive actions, and it is with reference to these that the inutility of the prevailing organization is most strikingly brought to light. When fighting on the defensive I admit that it would often be judicious to hold some guns in hand. It would indeed, I believe, rarely be wise to show all of them at the outset, and batteries might frequently be called up from the rear to repel or meet a flank attack, or to throw themselves freshly into the fight to check the assault of the foe at the critical moments of the day.

Moreover, the battles of which I have spoken having more or less an improvised character about them, are scarcely, it may be argued, fair examples, and it may be thought that in great decisive actions, deliberately planned and executed, different features will be revealed. But at battles such as Königgrätz, Gravelotte, or Sedan, one corps, at least as I have already said, must always be held in reserve, and its artillery will be available for special strokes if desired. Therefore, while for

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battles *de rencontre*, and on the line of march, it will be advantageous to have batteries divided equally between divisions, such an organization need not hamper a commander when on certain occasions where it is possible to forecast the course of the day's fighting he wishes to use guns under his own hand.

I have, I fear, so far dwelt entirely on one side of the question before us, and my readers may imagine my views are coloured with something like partiality. This is far from being the case, for I recognize and respect a vast weight of authority on the other side of the question. I will indeed now quote some opinions in favour of existing organizations, and endeavour to do justice to those who contend for their value.

First, I will state the opinions of Prince Kraft, whose opinions and experience in artillery matters we have reverenced for some years in this country. He was a man with a unique experience of modern war, and his ideas are based not so much on theoretical deductions as on his own observation in the presence of the enemy. And what does he say in his celebrated "Letters on Artillery"?

"The wish for this change originated entirely and specifically among the artillery. It is very disagreeable for the officer commanding a regiment of divisional artillery to see his regiment at the moment of mobilization divided into two parts, and to have nothing whatever to say to it, while the unity of the regiment, which is so important, is

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broken up just at the most critical time. But this is the only good reason for the abolition of the Corps Artillery."

This argument, as I have said, does not apply to our service.

He goes on, "Now this is really not at all an artillery question. I see that you are astonished at this apparently paradoxical assertion. But nevertheless I am right. If the Corps Artillery be abolished, an army corps will consist of two equal parts—the divisions. Thus the unity of the corps ceases to be a necessity."

I may note, as regards this contention, that it need not influence our decision, because in our service a corps is divided into three and not into two divisions, and in any case we never have fought in corps. We may nominally have done so, and during the Waterloo Campaign corps were certainly formed on paper. But nevertheless, the division, because our armies have been small, has hitherto always been our unit, and it is a question whether it be not still the best for us.

Prince Kraft goes on to show that a corps organization is the best for an army, and calls Napoleon to bear witness for him. In 1806, and again in 1866, a different system, he tells us, was tried in Prussia, and found wanting. He, however, is dealing with Continental armies, not with one such as ours.

But he is prepared to support Corps Artillery on broad tactical grounds too. "It produces," he

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writes, "in combination with the divisional Artillery, a tremendous effect whenever the general in command may please to use it; and thus prepares the way for the main decisive action. The very existence of a Corps Artillery points out that the effect of artillery should not be dispersed, but should be concentrated on the decisive point." Then he gives us a little glimpse of personal reminiscence, and he describes how during the long winter evenings of the siege of Paris, when the staff of the Guard Corps were enjoying a game of whist and any one played a trump, "See!" said the onlookers, "he is sending his Corps Artillery into action." The employment of those guns had come to be taken as a sign of energetic action. And the young officers at headquarters declared jokingly that the general in command, whenever he received a report which compelled him to mount his horse, used to call for "My boots, and the Corps Artillery!" Jests, like straws, often show the way the wind is setting.

Finally, he declares that the way to remedy the inconvenience of breaking up the regiment of Divisional Artillery is to augment the Field Artillery with a corps, and he says twenty-one batteries are the minimum necessity demands. Since he wrote, the Germans and French have raised the number of their batteries to twenty, and the tendency is to a further increase still. And we, too, are at length realizing the value of a strong artillery, and an effort is being made to raise fifteen fresh batteries.

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After Prince Kraft, no one is perhaps more frequently quoted in England than Von Schell, and he corroborates what the former says. But he is also, be it noted, the most fervid apostle of the doctrine which teaches us to engage all our guns as early as possible, and no one has more strongly recommended the system of pushing the guns of the rear division forward in the marching columns than has he. It is a curious fact that a German officer, who has very stoutly advocated the abolition of a distinct Corps Artillery, says that he was converted (or perverted, perhaps I ought to say) from the more orthodox ideas mainly by the arguments Von Schell has put forward in favour of a bold and early deployment of guns.

Von Schell and Prince Kraft are supported likewise by the authority of Von Boguslawski, who favours a Corps Artillery because it facilitates the handling of artillery in masses, the only true method of its application. I have seen Meckel also quoted on the same side, as lending his concurrence to what Prince Kraft says. But his opinion really goes against us in England, for he expressly states that when a corps is divided into three divisions a Corps Artillery is no longer a necessity. The commander-in-chief, he adds, may on a special occasion elect to appropriate the artillery of any of the divisions for his particular purposes, and the guns thus set aside would constitute what is practically a Corps Artillery, just as did the batteries of the Imperial Guard in

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the majority of Napoleon's battles. These are his words: "An army corps formed of three infantry divisions certainly does not need a Corps Artillery. The artillery of that division, which the general would in every case hold in hand, constitutes, in fact, Corps Artillery. In this case we ought to strengthen each division from the first with as much artillery as possible, and not unnecessarily increase the labour of issuing orders by adding a Corps Artillery."[1]

We need not further seek a solution to this question by counting noses on the one side and the other. I have named several distinguished names in support of the existing system, but there are, perhaps, those which carry as much prestige of the opposite opinion. Von Scherff, for example, and Von Rohne, and the authors of several anonymous articles in German publications. Their views are admirably epitomized in the new volume on Field Artillery, by General Müller of the German Army.

In England, a few years ago, Colonel Buchanan-Dunlop, then Professor of tactics at the Royal Military Academy, suggested in public, at the United Service Institution, that we should not only abolish Corps Artillery, but that we should cease from permanently organizing even Divisional Artillery. Our batteries, according to his view, had best be all combined together as squadrons are in a Cavalry division, and be subdivided amongst the component

[1] "Allgemeine Lehre von der Truppenführung im Kriege," by Colonel Meckel, p. 95.

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parts of the corps when required, or utilized as a mass according to the ideas of the general in chief command. I think myself that would be a somewhat drastic reform, and would destroy many of the advantages we may derive from the intimate connection we hope to see growing up on active service between the different arms of the service, and especially between the guns and the remainder of the division to which they belong.

When, however, so many are not afraid to raise their voices against the almost universally existing organization, I think it must be based on foundations less secure than we may have hitherto been led to believe, and there would appear to be at least a *primâ facie* case for careful inquiry. There certainly does seem to be cause for suspicion whether, with our three divisions in one corps, we are on the right track in legislating for a fourth artillery unit on mobilization. Probably, however, no change will be made by any power until the next great war has been fought out. We shall then see many vexed questions settled, and no doubt many alterations in the constitution of armies will be made. But until we have had a war we shall have no new reliable data to guide us, and the prevailing fashion will hold its own.

One innovation, however, would not appear a very rash one, and has had a counterpart in the history of the past. It is somewhat in the nature of a compromise, and peace, with its many councillors, encourages compromise.

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Many fancy they foresee the future development of field artillery in high explosives. Now, to fire such explosives with safety we want a gun with a low muzzle-velocity, and to get a good effect we need a shell larger than that which our present field-guns fire. We require, in fact, a howitzer. Likewise, if troops ensconce themselves behind artificial cover, and it seems not unlikely that they will avail themselves largely of such protection, at any rate when acting on the defensive, we may be able to reach them by means of high angle fire, when it would be waste of ammunition to cannonade their positions with guns of flat trajectory. We may, in fact, before long feel the necessity for special weapons for special situations and occasions. It would not be wise—it would, indeed, be in the highest degree rash—to arm all our field artillery with howitzers, at least until we have more to guide us in the way of practical experience. Such pieces would scarcely be able to take part in the artillery duel as we at present understand it. But some held in reserve until the moment of the infantry assault might then find their opportunity, and might lend invaluable aid to their side. Is it an unsubstantial dream to imagine that several batteries so armed, and firing heavy projectiles filled with high explosives, might be brought up to turn the scale, as did the weight of the final mass of guns in the old wars? Abroad, almost all the great powers are turning their attention to vertical fire in the

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field. Russia has taken a definite and decided lead here, and we ourselves have three howitzer batteries in our service already, and are to have three more, while a howitzer battery is to take part in the expedition which is on its way to Khartoum. It seems, therefore, very probable that future wars may see howitzers used again, and in that case they will form a special unit of Reserve Artillery under the direction of the general in chief command. The two batteries of Horse Artillery in our Corps Artillery might also remain where they are, because their great mobility will make them especially valuable in meeting a flank attack, in making a demonstration in rear or flank of an opponent, and for other special occasions which might crop up. In that case we should have a real "Corps" or "Reserve Artillery" once more, which would naturally fall into its place on the battle-field, and whose functions would be clearly defined by reason of the special characteristics inherent in its armament and mobility. The remainder of the field-guns proper, with additional guns to bring them up to foreign standards,[1] would be allotted to the divisions, and there would be no longer any confusing or pedantic distinction between things which are practically identical when once they are thrown into the turmoil of the fight.

[1] There are six field batteries with each division of the French and German armies.

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CHAPTER IV.

THE HANDLING OF MASSES OF ARTILLERY.

"In military matters two and two do not make four, unless they are brought together in concerted action." [1]

THE question which forms the title for this chapter is for Artillery, that of the hour, but scarcely less does it bear upon co-operation with the infantry of an attack. Range and mobility are the chief characteristics of modern guns, and it is precisely these two endowments that enable them to be employed in masses. Union is strength; combination gives force its opportunity, and the history of Field Artillery is but a demonstration of these truths. The splendid results obtained by the eighteen guns that crowned the Janusberg, at Rossbach, were not lost sight of by the soldiers of Frederick's time, and Kunersdorf, Hochkirch, Torgau, not to multiply instances, all yield illustrations of how guns, emancipated from the battalions, might with success be directed in concert with other arms by one will, to the attainment of some great end.

[1] "The Influence of Sea-power on the French Revolution and Empire, 1793-1812." By Captain A. T. Mahan, U.S. Navy.

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Batteries, however, in the last century moved at best but slowly, and were in little favour with generals accustomed to see battles won by squadrons. Their organization, too, was only primitive, no definite regulations were in existence, and only a few instructions, which even in those early days, however, be it noted, inculcated the value of a concentration against the point to be assaulted, and of uniformity of direction.[1]

At a time when guns were endowed with only limited range and mobility they had often to be contented with such positions as were left them between the infantry, and had to take their stand, not where they might effect most, but where they would interfere least with their comrades.

Napoleon, when he set himself to develop the efficiency of his artillery, had first to overcome the difficulties with which a defective organization hampered them. Two men of exceptional ability, Senarmont and Drouot, seconded his efforts, and a mass of guns giving the decisive blow of the day became a marked characteristic of his later battlefields. Other nations followed the lead of the great master till, at Leipzig, the long line of the Allied guns made him angrily exclaim, "At last they have learnt something."[2]

[1] *Vide* translation from *Neue Militarishe Blätter*, in the "Proceedings" of the R.A. Institution for September, 1888.

[2] "Précis of Modern Tactics" (Pratt and Home), p. 88.

How swiftly, decisively, even impatiently Napoleon turned guns to account is very strikingly illustrated in the account of his passage of the Elbe, in May, 1813:—"No sooner did

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But, well appreciated though the power of a mass of guns might be, the inferiority of the *matériel* in use, as I have already said, still prevented them from concentrating their fire without a change of position, and consequently, when a great effect was desired, a mass of batteries had to be brought up to the decisive point. In order that this mass might be ready to respond quickly to the call for it, it had to be held in reserve till the supreme moment arrived.

Thus, while Napoleon was particularly careful to keep his artillery in close association with the other arms, he was obliged, as has been noted in the previous chapter, to utilize as a reserve the guns of the corps (usually that of the Guard [1]) not engaged.

The American War of Secession showed that the secret of Napoleon's success with artillery had not been lost sight of on the other side of the Atlantic. Malvern Hill and Gettysburg are as conspicuous artillery battles as Friedland or Wagram, and Hunt and Alexander are names as worthy of remembrance by gunners as are Senarmont and Drouot.

Napoleon see the preparations of the enemy than he called out, in a voice of thunder, to General Drouot: 'A hundred pieces of cannon!' and posted himself at a short distance in the rear, to direct their disposition. The Artillery of the Guard quickly came up at the gallop."—Alison, vol. xvi. p. 226.

"C'est l'artillerie de ma Garde qui décide la plupart des batailles, parce que l'ayant toujours sur la main, je puis la porter partout où il est nécessaire."—Napoleon.

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Coming down to 1866, we find the Prussians keenly alive to the lessons of the earlier wars, but following still, in spite of the experiences of 1859, the methods which showed Napoleon at Leipzig that "they had learnt something." To benefit by teaching, you must be ready to modify lessons as circumstances alter, and apply knowledge to the situation of the moment. The invention of rifling had enabled guns to be utilized from the very beginning of an engagement, and the Austrians brought the bulk of theirs to bear from the first. The Prussians hesitated to avail themselves completely of the consequences which had followed the advance of science, and while they massed their guns, held them uselessly in hand.

The fact that a mobile and far-ranging artillery is practically a new arm, had not indeed been realized. Mobility allowed guns to be combined together, and at favourable opportunities, even when their range was short, that quality was sufficient to permit them to intervene decisively in the fight. Now, however, when great range and accuracy have been added to mobility, it is possible to concentrate guns together *always*, and they can change their target without altering their position. And it must not be forgotten that, to thoroughly develop the advantages of concentration, a certain fixity of position is required, and that ground once taken up must not be lightly abandoned.

Use in masses is, in fact, the logical sequence to

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mobility and range.[1] Thus all the circumstances of the present day favour such an employment of guns, and the moment for the consideration of how best they may be trained to that end is ripe.

A more imperious necessity, however, than either convenience or propriety forces the question on us.

There is a distinct tendency among all the Continental powers to increase the proportion of artillery which accompanies their armies. Guns which might be firing cannot be kept idly in rear, and consequently a vast number of pieces have to be arrayed side by side on a modern battle-field; and they occupy so vast a space that concentration in masses is no longer a matter of choice.[2]

Even in 1870, when the proportion of guns with the German armies was smaller than it is at present, the tendency to push all the guns into

[1] "L'Artillerie de Campagne en liaison avec les autres Armes" (Langlois), vol. i. p. 382.

[2] How much circumstances have altered since the time when some officers, now serving, joined the service, is exemplified by a reference to the "Aide-Mémoire to the Military Sciences" of 1846, which puts the proportion of two pieces of ordnance for every thousand infantry as the best for us, "considering how much the perfection of the infantry force diminishes the quantity of artillery necessary to an army." In our army that proportion is now 4·2, while abroad it is, in the French and German armies 5, and there is a tendency for it to grow still larger.

See also "Die Entwickelung der Feld Artillerie, etc.," by Lieut.-General Müller (Berlin, 1893), vol. ii. p. 293. He, however, puts the strength of the infantry, in a German and French corps, somewhat higher than other authorities.

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the first line from the outset rendered it by no means easy for their batteries to find positions.

In the first battles of Spicheren and Wörth the German batteries occupied a space equal to one-third of the whole front of attack. At Colombey and Rezonville the fraction was slightly larger, while at Gravelotte they extended over two-fifths of the German line.[1] Indeed, were it not that science has again stepped in to aid us, the problem of how to derive full advantage from a numerous artillery, would present a most formidable difficulty.

Smokeless powder, however, will enable guns, not only to be massed, but to be posted in tiers, and such an application of them has already become a familiar feature of foreign manœuvres. Thus placed, their control by one hand becomes more than ever imperative, and the latest developments of tactics, therefore, go to fortify the arguments already used in favour of such a method of employing them.

Before, however, we enter on questions of organization or training, it will be well to make what is meant by the term "masses of artillery" quite clear, and indicate the objects for which they are usually called together.

The Austrian Artillery Regulations of 1866 are the first which have ventured on a definition, and given official recognition to the objects with which

[1] "Field Artillery," by Lieut.-Colonel Sisson Pratt.

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they might be formed. According to them "Several divisions of batteries, separated or united, led by one leader, and directed against the same target, constitute a mass of artillery." This definition is, however, somewhat unsatisfactory at the present time, because, in the first place, it has become generally recognized that unity of direction and concentration of fire is only to be obtained by concentrating guns; and secondly, because it would seem to imply that masses of guns must concentrate their fire always on one and the same target. Unless this latter dictum be intended in its broadest sense, it cannot be entirely accepted, and it is open to misconstruction. Masses of guns, it may be assumed, will at certain stages of the fight bring their fire to converge on an objective which might correctly be described as one target, but often that objective will only be relatively small, and a concentration on any one portion of it, restricted enough to be regarded as what we are accustomed to speak of as a target, would be an error. For example, a mass of guns might be formed to enable a village to be carried. Some of the batteries would fire on its borders, and the space to be cannonaded would be distributed amongst them; others would assail the principal buildings, others watch the hostile guns and prevent, if possible, their deployment; while the majority, we may assume, would bring a heavy and converging fire to bear upon that portion which had been specially selected for

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assault. The mass here is directed on the same objective, and yet upon one that offers several targets. It will be better to avoid pedantic niceties and to state generally that *a mass of artillery means the concentration of a greater number of pieces than are contained in the tactical units of the day for the attainment of some definite end.*

The tactical unit, we must remember, varies with the improvements which have been effected in the arm. Formerly, the battery was thus regarded; now, and for some years, in all armies, the brigade division has taken its place, while the battery is left as the technical or fire unit. In Continental armies, moreover, a tendency to accept a still larger tactical unit is noticeable, due to the growth in importance of field artillery, but for our purpose the definition I have given will fully suffice.

And now, with reference to the objects with which such masses have already usually been formed.

They have been used:—

To crush the enemy's resistance and force a way for the columns of attack (Wagram, Waterloo, Gettysburg).

To make or repel a flank attack (Rossbach, Bautzen, Manassas, the employment of von Wittich's guns, in the evening, at Loigny-Poupry, and those of the French Guard, during the morning, at Wagram).

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To cover the issue from a defile, or the passage of a river (Hanau, Fredericksburg, where Burnside brought 147 guns to bear).[1]

To fill a gap in a weak or shaken line (Wagram, Beaugency, Noisseville).

To enable a beaten army to retreat (Königgrätz).

But the advances in artillery science have given the arm such independence that during the Franco-German war it dared more greatly, and it is not unreasonable to assume that we may see it again aspiring to deeds equally bold. Thus: An artillery mass surprised the enemy at Beaumont. One was driven like a wedge into the hostile line, in the case of the Hessian batteries at Gravelotte.[2] One was built up to form a solid advance line in attack, to hold the foe (Vionville) and on the defensive to harass his advance guard, and force his artillery to deploy (the artillery of the Austrian 10th Corps at Königgrätz).

Lastly, but oftenest perhaps of all, masses of guns may be deployed (as in many of the great battles of 1870, and at Gross Beeren), to silence and beat down the enemy's batteries.

Having thus reviewed what combination of guns have done in the past, and shown that they,

[1] 147 guns were employed, which fired 7356 rounds of ammunition, and according to an eye-witness, "100 guns per minute were frequently discharged."—"Life of General R. E. Lee," by John Cook, p. 176.

[2] Quoted by Langlois in "L'Artillerie de Campagne."

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by reason of their greater perfection, are now always and everywhere disposable, and that the tendency, as manufacture progresses, is to take advantage of their powers in a more extended fashion, we may turn to the question of how such a mass is best organized.

A mass of guns must be formed according to the circumstances of the moment. The leader of the troops in general would indicate the moment for its formation, and decide as to its composition. To do this he should understand artillery so thoroughly as to be able not only to recognize the opportunity, but the configuration of the ground, which will render his scheme feasible.[1] Nor should he ever hesitate to remove divisional artillery from the divisions if the situation demand it, a remark I do not consider it superfluous to make considering the ideas which still seem to survive in our army. He will sometimes himself give the impulse to the guns, as did Napoleon to the batteries of the Guard at Wagram, and as did the German leaders on more than one occasion in 1870. Or he will delegate the duty to some high artillery leader, as in the case of Lauriston during the last phases of Wagram. Most often must the commanders of army units act decisively for them-

[1] "Artillery is the arm which produces the great effect proper to it, only when directed on the main issue."—Colonel Wille, in an article on "Manœuvres, &c.," translated by Lieut.-General W. H. Goodenough, C.B., R.A., "Journal of the United Service Institution," vol. xxxviii.

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selves, as did Longstreet at Manassas, Blucher at Bautzen, or Von Wittich at Loigny-Poupry.[1] Occasionally the initiative will come from the artillery leader himself, as in the case of Drouot at Hanau, or Senarmont at Friedland.

The Officer Commanding the Artillery would usually lead the guns himself. Whoever he be, however, who takes command of such a mass, he should seek, both in the occupation of positions and during subsequent movements, to facilitate the return of the various units which compose it to the orders of the commanders of the body of troops from which they were originally taken.

In our service there is no connecting link in the hierarchy of command between the Officer Commanding Royal Artillery of a corps and the Commanders of Brigade Divisions.[2] The Corps Artillery, however, being composed of three Brigade Divisions (Horse and Field) has an officer at its head who would, from his status, naturally supply a leader for a mass not sufficiently large to absorb all the attention of the Artillery General. Where a very large mass was formed, such as during Continental wars and manœuvres has been composed of the artillery of two Corps d'Armée, a special leader would be designated. It is to be noted that Continental organizations by which there are

[1] "Kriegsgeschischtliche Einzelschriften," vol. vii.

[2] *Vide* "Field Army Establishments." The Lieut.-Colonels with Corps Field Artillery have charge of Corps Ammunition Reserves, in addition to their batteries.

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only two divisions in a Corps d'Armée, and in which the Divisional Artilleries are represented by two regiments of six batteries, or two Brigade Divisions, greatly facilitate the employment of artillery in the manner under discussion. The Officer Commanding the artillery of a division has a special staff, and is of a rank superior to those leading Brigade Divisions. So is it also with the Corps Artillery. There are already, therefore, three small masses, with a leader and staff complete, in every Corps d'Armée, and they form the nucleus for the formation of still larger masses.

Our organization, with its three isolated Brigade Divisions, and a Corps Artillery, does not favour the proper application of guns, and, from the artillery point of view, is to be deprecated. I have already discussed the proper distribution or organization of artillery with a Corps d'Armée, and need not here again revert to it, but it is legitimate to point out that Brigade Divisions and Corps Artillery Commanders with us should be provided with a staff more adequate to their requirements than they already possess. Each now has to look to his battery establishments for his staff in the field, beyond the Adjutant.[1]

Foreign leaders of divisional artillery are far more liberally supplied in this respect, and

[1] *Vide* "Field Army Establishments." A Brigade Sergeant-Major is spoken of in the drill-book, but he does not really exist.

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experience has shown, not unnecessarily so. The correct direction of even three batteries in action requires a well-matured system of sending messages and orders. Where masses are concerned the demand for such aid becomes far more urgent, and it is no exaggeration to say that it is indispensable. In the French service messages and orders are carried by "*Agents de liaison*," specially trained for the purpose, and the experiences at the practice of masses of guns, which are annually carried out at Châlons, have called them into existence.[1]

In Germany we find the education of "*Meldereiter*," with a view to their intelligent appreciation of the messages they carry, also insisted on. We may fairly assume, therefore,[2] that in England a few orderlies specially trained for the purpose should form a recognized portion of the staff of the Divisional Artillery. Even in peace time, a trumpeter might with advantage be added to it, and also a sergeant-major. The Corps Artillery leader should have a similar staff at his disposal. We should then possess the germs from which an efficient mass of guns might be expected to spring. Such an addition to our artillery organizations is surely a very modest

[1] *Vide* the account given of the manœuvres at Châlons, by Lieut.-Colonel Cohadon, in the "Revue d'Artillerie" for November, 1892.

[2] Some recent articles in the "Russian Artillery Journal" show that in the Russian army, also, the same demand for these orderlies has been put forward.

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one, and is kept as low as possible in order that it may have a chance of being accepted.

Further, it may be added that the necessity for special scouts for the minor battle units is being everywhere felt, in consequence of the introduction of smokeless powder and the difficulties thus engendered in discovering the proximity of an enemy. Good scouting demands special training, and it is not enough to rely on the services of a man picked up casually because he is not otherwise employed, or to weaken gun detachments by removing men who ought to be working guns. Moreover, each arm has its own peculiar requirements and weaknesses, and these should be thoroughly appreciated by those who look after its safety.[1]

Even a battery should, in regard to the increased independence with which guns have lately become endowed, and are rightly expected to display, be sufficient in itself for all the exigencies of war, and the new German Artillery Regulations have prescribed that batteries, especially those on the flanks, must not rely for security against surprise on the other arms alone.[2] In the

[1] *Vide* opinions expressed in "Berittene Infanterie Patrouillen eine consequenz des heutigen Kampfes," by Major Karl Regenspursky. Published in Vienna, 1890.

"L'Artillerie de Campagne en Liaison avec les autres Armes," vol. ii. p. 358.

"L'artillerie est donc l'arme qui a le plus besoin d'être éclairée" (Ibid. vol. ii. p. 259).

[2] "It is the duty also of Group Commanders to reconnoitre the ground in front of the position."—"The Tactics of Field Artillery," by Von Schell, p. 92.

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French artillery, where establishments are already on a particularly liberal scale, both as regards men and horses, it has been recommended by Colonel Langlois that four men and four horses should be provided and trained for this special service on mobilization, to be represented by half that number in time of peace.[1] It is therefore suggested that some such increment will be necessary in our service, and will materially facilitate the judicious handling of large artillery bodies. The lessons of recent artillery tactical days at Aldershot, especially when cordite has been used, point strongly to a similar conclusion, and reinforce the arguments already adduced.

The two specific recommendations thus put forward appear the only innovations absolutely necessary in the organization of our existing artillery units, but it will not be superfluous to say something generally with regard to organization in relation to the combined handling of batteries, for deficiencies here have been always the greatest obstacle to their consistent employment in the manner we are dealing with. Frederick, and also Napoleon, experienced and remedied such defects, but brilliant as have been the achievements of our smaller units, and unsurpassed as they have ever

[1] "L'éducation de ce personnel se ferait de la manière la plus fructueuse dans tous les exercices tactiques sur le terrain."

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been, both as regards *personnel* and *matériel*, few combined efforts of artillery have distinguished our military history.

Precisely the same defects in organization which we have suffered from had to be overcome in America before the arm could assert its real value. When the War of Secession broke out, the batteries of the Union were first attached to brigades and afterwards to divisions."[1]

It was not till March, 1864, when bitter experience had demonstrated the more excellent way, that the batteries of each Corps d'Armée were united into a brigade, and were placed under the command of one leader, with a distinct staff and supply department. Up till then, even in the Army of the Potomac, which was the first organized of the Union forces, the four batteries which were attached to a division were commanded by captains, there was no officer in general command of them, no field officers, and no staff. The batteries, individually good, were but isolated units, and were attached like excrescences to incongruous commands of infantry. There was no gradation of rank or command, nor was any combined action possible.

There was, however, a "reserve" of artillery,[2] and the organization of this reserve, side by side

[1] *Vide* articles in the "Journal of the Military Service Institution," U.S.A., by General Tidball.

[2] Eighteen batteries, sub-divided into three brigades.

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as it stands with the feeble system just referred to, well exemplifies the point I wish to lay stress upon. It was complete in itself, and had a distinct commander and staff. Its batteries being concentrated under the eye of an experienced chief, Major-General H. T. Hunt, were always ready to hand when needed, were more efficient than any others, and came to be regarded with pride and confidence throughout the army. These batteries formed a "reserve" only in name, were always first in the fight, and foreshadowed, indeed, that "Corps Artillery" which became the trump card in the hands of the German generals of 1870, and has been organized in almost all armies ever since.

On the Confederate side the same difficulties were met by the same remedy, and before a year was out the genius of Lee, recognizing what was required, had organized his isolated batteries into "battalions" of from four to six batteries, under the command of a lieutenant-colonel or colonel, while a major was allotted to every two batteries.

Turning now to the war of 1870, we shall find the deficiencies of the French artillery largely attributable to the very same cause which had been shown inimicable to the arm during the American War. On the German side, not only had the batteries been trained to act in masses from the very commencement of the fight, during the interval of peace since 1866, but instructions

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were issued during mobilization, laying special stress on this particular. In France, however, the battery had remained the tactical unit, and each acted for itself.

At Woerth we find the whole artillery force of the Germans flinging itself in combination, with all the speed it could command, upon the foe. On the other side, although the French had twenty-two batteries on the field, there were never more than seventeen in action at the same moment, and then they were too disseminated, and sometimes stood for as long as half an hour in position alone.

	Number of batteries in action on French side.	
[1] From 9 o'clock to noon	9	
„ noon to half-past 1 o'clock	13	
„ half-past 1 to 2 o'clock ...	17	or perhaps a few more.
„ 2 to 4 o'clock	9	
At 4 o'clock	13	or perhaps a few more.

The three batteries of the 2nd Division (reserve) were not in action till one o'clock. Of the four batteries of the reserve, one (attached temporarily to the 7th Corps) took up its first position at one o'clock; the other three not until four o'clock. These batteries of the reserve were, it is true, held in concentration after four o'clock, but their opportunity had then vanished. They were put in position under the short-range fire of the

[1] "L'Artillerie de Campagne en Liaison avec les autres Armes," by Colonel Langlois, vol. i. p. 368.

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German Infantry, and could do nothing but sacrifice themselves bravely.

Having thus examined the causes which have lain at the root of the artillery deficiencies and successes in the past, we can understand how it is that in every modern army the Brigade Division of three batteries has come to be regarded as the tactical unit of artillery, and yet that battery leaders need not be hide-bound by rigid rules. That unit has been evolved as the best during the experiences of the battle-field, and it is so recognized by all authorities.[1]

It may appear to those familiar with Continental organizations that to dwell on the necessity for at least three batteries, held together under one command, being regarded as the tactical unit of artillery is unnecessary. Universal recognition is now, no doubt, given to the principle, but in our service, where some batteries, owing to the

[1] "Les faits de 1866 ont fait comprendre aux Prussiens la nécessité d'un commandement supérieur, d'un commandement tactique du groupe, pour assurer la convergence des efforts, seule susceptible de produire un résultat, surtout dans l'artillerie.

"De là augmentation de l'unité tactique qui devient l'abtheilung et qui est organisée solidement."—Langlois, "L'artillerie de Campagne," vol. i. p. 239.

"The great range and accuracy of the modern gun renders the combined action of a group of batteries far more effective than was formerly the case, and tends to increase the size of the tactical battle unit. The group of three or four batteries will, when practicable, be replaced by a unit of double its size, working under one command, and kept together prior to deployment."—Lieut.-Colonel Pratt, "Précis of Modern Tactics," 1892, p. 89.

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exigencies of barrack accommodation, are still isolated in their peace stations, and where some Majors have, perhaps, never yet served in a Brigade Division at all, we still find a few so wedded to old-fashioned ideas that they regard the battery both as the tactical and fire unit, in spite of all the drill-book says to the contrary.

The whole efficiency of a mass depends on the opposite principle being understood, and until we thoroughly appreciate the union of three batteries together, it is idle to talk of combining perhaps ten or fifteen. The Brigade Division is the foundation from which the mass must spring. At the same time, the independence of the battery leader, within his own sphere, must be carefully respected. The object of combining batteries is not to destroy that most valuable quality. It is rather to assist the subordinate commander, and relieve him of one set of responsibilities, in order that he may give his whole and undivided attention to what, after all, is the first duty of artillery, namely, fire. We must, therefore, in the formation of masses, remember that two interests, independence and subordination, have to be reconciled, but that they are not necessarily antagonistic.

The duties of the higher artillery leaders are tactical, those of the Battery Commanders technical —"nicht die Waffe Kämpft, sondern der Mensch"[1]

[1] "Die Entwickelung der Feld Artillerie, etc.," vol. ii., by Lieut.-General Müller. Berlin, 1893. And the personality

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—but there need be no more difficulty in both amply filling their positions than there is in the case of a Brigadier and his Battalion Commanders.

In organizing artillery masses we have, therefore, first to legislate for unity of command, and that is the chief essential to success. It, however, also forms the most difficult portion of our task.[1] We must endeavour to build up the mass from below—the battery leaders understanding and being uninterfered with in their sphere; the Brigade Division being held together, if possible, trained together, and worked together in action; and its commanders, in turn, looking to a higher leader still when larger combinations are necessary. To this end it is desirable that in times of peace, whenever possible, such higher leader should assume direction of a mass, and it is especially desirable that he should do so at practice. It is only when guns are actually firing at targets, and you can see tangible proof of the efficiency, or otherwise, of their handling, that lessons are appreciated. Moreover, on such occasions the necessity for a uniform system of direction becomes evident. All batteries and Brigade Divisions should speak the same tactical language. Then when on service, as must happen sometimes, batteries or

of the leader should, therefore, influence as wide an area as possible.

[1] "The first difficulty of the application of artillery in masses lies in the system of command."—Von Rohne, Professor of Artillery at Berlin.

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Brigade Divisions have to be brought into position wherever space may be forthcoming, and they stand, perhaps, beside those which have been trained under other eyes, or are all at some eventuality taken in hand by a supreme leader, there must be no misunderstandings, no feeling of strangeness, and no lack of union.[1] . . .

It will be admitted that the *rôle* of him who commands a vast line of guns is one of such exceeding difficulty that it demands an exhibition of the very highest military qualities. Not only should he display a complete grasp of general tactics, but he must have that facility in the compilation and issue of orders, on the ground itself, which is only to be acquired by constant practice.

It is not merely a question of manœuvring a great number of batteries. The following duties are what he will have greater need to excel in:—He must direct the preparatory reconnaissances, must define their special object, must be able quickly to satisfy himself as to their correctness, must form a decision rapidly, must write or edit the necessary orders, and must finally see that they are despatched sufficiently early to ensure their

[1] During the manœuvres at Swindon, in 1893, batteries not belonging to the same Brigade Division were, on at least one occasion, observed to come into and remain in action perhaps as much as 100 yards apart. The practice provoked the criticism of the chief umpire, who ordered that under such circumstances the senior officer present should assume command of all the guns, and work them in combination.

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due performance. To conceive, to be able to formulate and appreciate the full significance of what is ordered—these are the qualifications that are most essential to the artillery leaders, and it is only by constant practice on the field that they can be developed. A thorough tactical training the whole way through the hierarchy of command is necessary, and this can only be given at manœuvres, or, when these cannot be had, by exercising a mass of batteries against a marked enemy. To gain really valuable results it is also desirable to exercise batteries at field-firing. We cannot hope for much of this, in England, at any rate, but something will be effected even when blank only is used. It is, however, certain that masses cannot be efficiently handled in time of war if officers are not accustomed to them during peace.

The duties of the officer commanding a mass are, in the main, very similar to those of the brigade division (or in our service divisional artillery) commander. He should keep in touch with the officer commanding the troops in general, and should endeavour thoroughly to grasp all his scheme. He should select the positions and targets for the brigade divisions; inform the supreme leader as to results obtained; ask for, if he does not at once receive, orders, when the situation alters; and in default of them, never hesitate to take the initiative when the circum-

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stances of the moment require him to do so.[1] Further, it is well for him to remember that his orders should be brief and capable of liberal interpretation, and that he should only issue them when it is absolutely necessary for him to interfere. During the crisis of the fight he should also take care to explain, as closely as possible, to his brigade division leaders the way in which matters stand.

During the reconnaissance of the first fire position he will pay special attention to the position occupied by the enemy, and the ground available for his own batteries. Position is a paramount consideration in the question, and may be said to influence the efficient action of artillery almost more than any other. An eye for ground, such as will teach a man quickly to realize what sites will offer opportunities to his guns, should be cultivated. Not only that, but the space available must be clearly dealt with and judiciously apportioned amongst the brigade division commanders. Next, the portion of the enemy's line which is to be fired upon must be similarly divided up. Otherwise, not only will the first batteries which arrive seize on the most visible targets, but they will too prodigally occupy the available space, leaving, in their haste, too little for those who follow.

[1] "But we must be careful to preserve the proper mean between absolute independence and the necessary dependence on the orders of the general commanding."—Von Schell, p. 34.

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The functions of the brigade division leaders will be the same as when they are acting with their batteries alone, and similarly the battery commanders will follow the usual line which has been laid down for them in the drill-book, and which I need not discuss here. It is desirable, however, that fire should be opened simultaneously, and that it should be effective, if possible, from the very first. It should come, in fact, as much in the nature of a surprise as possible.

The experience of the French artillery,[1] which has carried out field-firing at Châlons with a mass of batteries, tells us that careful and methodical preparations in a preparatory position[2] are desirable, and that, while much must always be left to circumstances, anything like excitement or precipitation in coming into action must be avoided. The necessity for rapidity must not, however, be lost sight of either, but time should be gained rather by everyone concerned thoroughly understanding what he has to do and how to do it, than by any visible hurry.

Since, at the commencement of an engagement, a preparatory position could usually be selected under cover, the actual movement of the batteries

[1] *Vide* the account given in the *Revue d'Artillerie* for November, 1892. The exercises were carried out on a scale which is, I believe, still unique.

[2] "It is, therefore, advisable that the whole of the batteries should be deployed together, under cover, immediately in rear of the position, and move into it simultaneously."—Von Schell, p. 43.

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into position would be only over a very short distance, and it would be carried out under the immediate orders of the brigade division commanders, who should have little difficulty now in ensuring their practically simultaneous appearance. The leader of the mass would superintend the position of the limbers and of the ammunition supply in general, but he will interfere as little as possible with his subordinates, and supply of ammunition, a matter we shall later have more closely to consider, will, as far as possible, be left in the hands of battery commanders.

The officer commanding the artillery (and in our service, as we have shown, he will often be in command of the mass) will, however, keep in touch with the officer commanding the ammunition column, and will, on advancing into action, inform that officer as to where he will be found.

As has already been stated, the formation of a mass would usually be with some definite end in view, and since such end will very often be to overwhelm some portion of an enemy's line by a concentrated fire, the distribution and concentration of fire will be a matter which must largely occupy the mind of him who directs it. Whether during the early stages of a fight, such as we are now discussing, it will be wise or feasible to so concentrate is a matter on which it is impossible and undesirable to lay down any hard and fast rules. It is enough to say that the best results

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will be arrived at in the shortest time if successive portions of the hostile artillery are overwhelmed in turn. It is believed that the rules now laid down in our service represent all that is necessary here to say on this subject, and that they have been well and carefully thought out.

Colonel Langlois, of the French artillery, has, however, put forward a suggestion which is worthy of careful attention, and which, it is believed, will help us under certain circumstances to solve a problem which, until we have more experience from modern war to guide us, is beset with difficulty. When engaged with an enemy who is numerically more powerful than are you, it may often be impossible to ignore some of his batteries altogether, while concentrating on the remainder. We are told that it may then be a good plan to engage the whole of his front with a portion of your batteries, and then to concentrate a very rapid fire from the remainder unexpectedly, upon successively selected parts of his line. A sudden and overpowering storm of shells, which are termed by Colonel Langlois "*rafales*," may then effect much.[1]

It is noted, however, that such a manœuvre will demand very exact training on the part of the

[1] "L'Artillerie de Campagne," vol. i. p. 296, etc. *See* also "Journal of United Service Institution," vol. xxxvii. p. 948.

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artillery which undertakes it, if the vast expenditure of ammunition entailed is to be justified, and that it is only very highly-schooled batteries, backed up by prompt and perfect arrangements for the supply of ammunition, which would carry it out with success.

There is one other point which may be noted here, for it applies to every position which guns occupy where there are several batteries in line. It is sometimes thought, and possibly in one respect with justice, that exact drill and dressing are but of little importance nowadays to artillery, or that, at any rate, too much attention has been hitherto paid to them. In order, however, to ensure that the full activity of every battery shall be available for every emergency, it is desirable, if possible, that they take up a correct alignment, otherwise it may happen that when fire has to be turned to a flank some of the guns may mask the fire of the others. Thus, if several batteries be drawn up on an uneven or slightly curved line, and it should be necessary to turn fire considerably away from the target immediately in front of them, some of the guns in the centre may mask the fire of those on the flanks. Similarly, if the line of batteries be curved inwardly, those in the centre may find their fire interfered with by those that stand to their right or left. Moreover, to facilitate ranging, it is desirable that the correct intervals between batteries be observed. The crest line of the height occupied should also run, if possible, at

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right angles to the proposed line of fire, otherwise the batteries may be enfiladed from some other portions of the enemy's position, a notable example of this form of error being supplied us in the faulty position of the guns of the German 9th Corps, west of Champenois, at the battle of Gravelotte. And when it is impossible to find suitable ground at right angles to the line of fire the artillery leader will have carefully to consider whether it is better that the individual guns stand in échelon along the crest line, or whether the batteries should be placed at right angles to the line of fire, and themselves be in échelon while their guns are in line.

I now approach a portion of the subject where the question of how the batteries are to be manœuvred during an engagement becomes the dominant one.

Whatever may have been accomplished on the drill-ground, it is probably not an exaggeration to say that no man can personally handle a number of batteries under fire by voice or gesture, or control them in a manner that the leader of a Cavalry Regiment can grasp his squadrons. The noise, the excitement, the very rattle of the *matériel* will prevent this—only an exceptional man can do it under any circumstances, and in war we must legislate for mediocrity, not for genius. Prince Kraft, whose practical experience of modern war must make his opinions command attention, has said of artillery: "It must always strive to fight,

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as a rule, by Brigade Divisions—coming into action by isolated batteries is quite an exception. Entire Brigade Divisions are not, however, to be brought into action by word of command, or by bugle call ordered by the Commander, but the batteries are to come into action by the word of command of the battery leader, upon the orders of the Divisional Commander."[1] But assuming that a mass of guns will be manœuvred by Brigade Divisions, we must still consider what will be the best tactical formation in which they should move. If the configuration of the ground will afford them cover, the question is one simply of convenience, and the decision may be left to the circumstances of the moment. But, if there be no chance of obtaining shelter, a rapid advance to the front with as little depth as possible will be essential. If exposed to fire from a flank, column of sections at close interval will be best; but if, as is more usual, fire from the front has alone to be feared, a line will offer the best security. Yet to lead even three batteries in line across country is exceedingly difficult. We know it is true that von Bronikowski did thus lead three batteries into action over a stretch of more than two miles, on the 2nd of December, 1870,[2] but this is such an exception as rather proves the rule. Officers who have

[1] *Vide* translation by Captain, now Lieut.-Colonel, J. M. Grierson, p. 605, vol. xiv. of "Proceedings" of R.A. Institution. *Vide* also the opinion of von Schell in his "Field Artillery Tactics," p. 43.

[2] *Vide* "Kriegsgeschischtliche Einzelschriften," vol. vii.

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experienced the arduousness of the task will admit that there is considerable difficulty in preserving dressing, and that the flanks are always inclined to get too far forward. It is more feasible to handle the batteries at short échelon, a formation which offers many of the advantages of line, and is far more elastic.

The reconnaissance of the second and subsequent positions must be made while the advance of the batteries is in progress. The leader of the mass will hurry on, and make the most of the fleeting moments with the same ends in view as he had before. He must now, however, keep a sharp look-out for any dead ground in the neighbourhood, and seek protection, if necessary, from the nearest troops. The Commanders of Brigade Divisions will move ahead of their commands to him, and receive his instructions. It will now rarely be possible to surprise the enemy, and the first consideration will therefore be so to place the guns that they have the best possible chance of quickly killing their opponents.

When a Brigade Division leader leaves his batteries he must always hand over the command to the next senior, and the duties of all concerned will be very similar to what they were in the first position.

Circumstances will rarely or never justify a preparatory position, but an attempt at least should be made to preserve as much of the same methodical procedure as is possible.

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It will not often be safe now to place guns behind the crest, because in these positions they may be exposed to attack from infantry, and must have as little dead ground in their front, therefore, as possible.

A position on the crest, while more exposed, will frequently at this stage become obligatory.

I fear much of what I have said in this chapter is very technical, and will appear directed to Artillery officers alone. But I trust officers of all arms will study it, for the handling of Artillery in the field should be understood by all, and there is nothing here for which a special education is needed. The guns, too, are the concern of every one in the force they accompany, for they are working with one object only in view, namely, to prepare the way for the infantry attack. It is to their concentrated action towards this end that I will now turn, and will ask my readers to bear with a few technicalities a little longer.

It was to effect this great purpose that masses of guns have in the past most frequently been employed. It was the invariable practice of Napoleon thus to use his artillery, and his success was so marked that his example was not thrown away by others. We have shown that since guns have become endowed with increased range a concentrated fire from a large mass of them may be turned to account, even during the earlier phases of the fight, while the most modern employ-

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ment of the arm on the continent exhibits examples of the use of concentrated masses beyond even what was attempted by the great Corsican.

Moreover, to win victories, men, however accurately they handle their rifles, must ultimately come into personal collision. To enable them to reach each other the aid of guns is necessary, both to subdue the hostile fire and to bring about the culminating movement of the day. Where both sides are equally well armed, no progress can be reckoned on in the future, any more than in the past, until some overpowering force to create a crisis is called in. At the decisive moment, therefore, a mass of guns must be ready to turn the full blast of destruction on the decisive point. It is with this end in view that it should struggle during the earlier hours of the day, and it must disregard its own safety, and risk annihilation to support the infantry in its last strides.

It is, however, exceedingly arduous, especially during the close of an engagement, to preserve so close a grasp of every unit as will ensure success. The heavy firing will interfere with the issue and comprehension of orders; it is difficult with many batteries in line to make good practice; and finally it is not by any means easy to keep up the fire to the very last, and yet stop it just at the moment when the infantry is closing on its opponents. Yet the storm, when once let loose, must rage with pitiless fury

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until the bayonet is ready to take up its work.

The leader of the mass should be informed beforehand by the Commander-in-Chief what Brigade Divisions will be required to actually cannonade the point selected for assault, while the remainder guard the field of operations in general,[1] and the exact point selected will be explained to him as nearly as possible.

We must confuse our minds with no pedantries. When in tactical language we speak of a point we may refer to a considerable extent of ground. That space will next be divided, if necessary, amongst the various Brigade Divisions, and the leaders of these will endeavour to gauge and verify, if time permit, by a few rounds, the ranges of their targets. They will instruct their batteries as to the duties assigned to each, and will give orders as to whether fire is to be distributed as regards depth. The French consider that during the latter stages of an action ranging may often be found impossible, and that when this is so it will be wiser to distribute fire by the system of "*Tir progressif*,"[2] or distribution as regards depth (each battery section or gun, as the case may be, using a different elevation).

[1] It is usually necessary to continue to engage the artillery of the defence with some guns, "otherwise it will direct its fire on the attacking infantry, and inflict serious losses on it, to which it must not be subjected."—Von Schell, p. 77.

[2] *Vide* the report on the field-firing of masses of artillery, at the camp of Châlons, 1892, already referred to.

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The battery leaders will similarly instruct their Section Officers, and through them their gun-layers. It is necessary, also, to agree on some signal, by which the moment when guns are to leave the target they may be engaged with, and turn to their most serious duty, shall be indicated. During the manœuvres at Châlons, the Brigade Division which was nearest the infantry destined for the assault was given the hour by the leader of these troops, and at the proper moment fired three battery salvoes rapidly one after the other, which formed the signal to the remainder. As might be anticipated, however, mistakes sometimes occurred, owing to the nature of such a signal, but on the whole we are assured that good results were obtained. It is noteworthy that during the bombardment of Plevna, some of the heavy Russian siege guns attempted, in a somewhat similar manner, to direct the fire of the remainder, but with very bad results.[1]

A message conveyed quickly, or some sign passed rapidly from battery to battery, would appear a preferable arrangement.

With this consummation of its usefulness the potency of a mass of guns may be regarded as exhausted. Individual Brigade Divisions or batteries may accompany and follow up the rush of their brethren of the other arm, but scarcely so an agglomeration of units. Whether in view of

[1] Kouropatkin on the Russo-Turkish War; translated into German by Krahmer.

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the immense losses amongst horse-flesh that must supervene such an attempt will be often made, is a question; but, if the foe retire in anything like a rout, even a huge mass might undoubtedly advance to the position he has evacuated, and from thence pursue and harass him by fire; for it cannot too often be inculcated that as long as the foe remains within effective range, the pursuit by fire should never be allowed to slacken.[1]

In conclusion, I have only to add that the use of artillery in masses is no new thing,[2] and that we need depart from no traditions nor break with any cherished sympathies, when we loyally accept what the exigencies of modern war have imposed upon us. We may still be proud of our batteries, still respect the prerogative of their leaders, but we must give effect to our views under changed circumstances in a different way. A man will not clothe himself in precisely the same costume in January and July. In one case he may wear fur, in the other flannel. But he will nevertheless always dress on the same principle and to the

[1] The point is well brought out by Lieut.-Colonel Regenspursky, of the Austrian Army, in his recent book, "Studien über den taktischen Inhalt, etc."

[2] Thus Lieut.-General Müller, in his recent volume on "*Die Entwickelung der Feld Artillerie, etc.,*" points out that the modern views with regard to artillery tactics, based as they largely are on the experiences of 1866, closely correspond with those laid down by Tempelhoff, in the translation by Paget: "*Essai sur l'Usage de l'Artillerie dans la Guerre de Campagne, etc.,*" published in 1771.

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same end, namely, to keep his body warm. Artillery has the same objects in view now as it had at the commencement of the century, but its application must be modified, nevertheless, to suit the alterations which the march of science has drawn with it. Where the battery was once all-sufficing, the Brigade Division must now take its place, and we must work through even that unit to larger masses still, as long as we organize our army on Continental lines at all. Artillery was always most effectively employed when it was thrown ungrudgingly into the scale. The growth and continued advance of ballistic science has not only developed the possibility, but has increased the necessity, of so employing it. Where large armies meet it will indeed be impossible to handle it otherwise. This being so, and bearing in mind the difficulties of directing the fire of even three batteries, how important is it for us to strive after a good and uniform system of dealing with that of several Brigade Divisions? We cannot hope to come even within sight of perfection unless we have opportunities of practice during which every link in the chain may be tested, and every soldier, from the very highest to the lowest, learn to understand one another, to support one another, and work together for the common end. Our discipline, especially as regards fire tactics, must control a wider field than that occupied by six or even eighteen guns.

It is true that Artillery, however brilliantly

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led, can never carry away trophies and tangible proofs of its courage, but it can pave the road of triumph for the other arms, and, if it has done so, it will have earned their respect and gratitude.

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CHAPTER V.

THE CHOICE, OCCUPATION, AND CHANGE OF POSITIONS BY FIELD ARTILLERY.

In the preceding chapter much has been said as to the occupation of positions by artillery and of the importance of well selecting them. The subject merits a close consideration, because of late not only has the matter of positions provoked an unusual amount of discussion at our exercises and manœuvres, but we have recently seen opinions and recommendations and criticisms published in our professional papers which, while they testify to a widespread and keen interest in tactical problems, manifest also, if I may say so without presumption, the existence of misconceptions due perhaps to inadequate consideration of practical difficulties. Until these latter have been personally experienced, they are not infrequently passed over with too little notice. A method of bringing guns into action in Germany has been warmly advocated, and I feel that an examination of it will not be superfluous, although it has not, even in Germany, commanded the universal admiration which some writers have attached to

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it. The method I refer to is based on an unlimbering considerably behind a crest line and running the guns on by hand until they can just see their objective over the top. I shall speak of it now as the "creeping" system, not in any spirit of sarcasm, but simply to define it from the other methods which we have already terms to identify. Other writers have devoted many pages to the discussion of almost all possible positions and methods of occupying them, and yet perhaps have scarcely provided us with conclusions which are completely satisfying.

Some of my readers will, I am sure, have heard of or read these articles, and most of them, I may presume, are acquainted with the two normal methods of occupying positions which our Field Artillery use and with "Field Artillery Drill, 1896," page 12, which tells you what you should look to when choosing your ground. That is to say, put briefly—

A clear view of your target, and ground you may want to cover. A good platform for your guns, and no obstacle to movement. As many difficulties towards approaching you, and as few facilities towards ranging on you, as possible. Lastly, cover, natural for choice.

The book does not tell you how all these requirements are to be provided for in practice, nor shall I attempt the task. A legal text-book may give you principles and precedents, but it cannot put a convincing argument into your

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mouth. That must depend on how discreet and opportune you are in utilizing your knowledge. So also in judging how you may best elude observation in the field and at the same time perform your duty fully, you must be guided by the tactical situation, the lie of the ground, the light, the background, the state of the soil, and the condition of your men and horses. That is why the drill-book does not attempt to discuss the forward slope, the background, and some other points of which it does not intend, I presume, that officers should lose sight. Personally, I think also that it is best not to burthen a man's memory with more theory than can be avoided, but to leave a good deal to his own judgment.

All the circumstances must be taken into account. What may be a good background when using black powder may be the reverse when using cordite. If your men are tired, you cannot adopt a procedure that might be advantageous with strong and fresh detachments; but there is one principle, at any rate, which never varies, and it is this—

Whether you go on the crest, or on the forward slope, or on the reverse slope, your first thought should be as to how best you may accomplish the purpose for which guns are brought into the field, namely, the destruction of the enemy.

My readers will do well to note also that you cannot work guns on a reverse slope where there will be much recoil.

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In that case, if there be no background, go in front of the crest, but remember that then you must go a considerable way down the forward slope, or ammunition wagons will show up on the sky-line even if your guns do not.

You will also sometimes have to unlimber on the crest itself if both front and rear slopes are steep.

The reverse slope offers greater facilities than the forward slope because not only the supply of ammunition, but the removal of wounded men, the repair of *matériel*, the service of supply in general, the communication of orders, and the preparations for movement can all go on unperceived by the enemy.

Both the positions on the crest and reverse slopes have therefore advantages over the other one on the forward side; and, finally, it is not only more difficult for the enemy to range if they are occupied, but the effect his fire produces is invisible to him.

These advantages, combined with the slight additional shelter from bullets obtained, are enough to make the position on the reverse slope the one which is usually adopted, not only by our own artillery, but by the batteries of France and Germany and, I believe, of the other European powers also.

As regards what the writers on the "creeping" method have said with reference to the favour with which it is viewed in Germany, we may note

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that some eight or nine artillery officers attended the German manœuvres in the neighbourhood of Hamburg during September, 1897, and that although all of them were specially on the look-out for that method, not one of them ever saw it attempted. Another officer, who accompanied four army corps in the field during manœuvres in 1896, has also stated that he never saw the "creeping" method used at all. On the other hand, this officer was much struck by the precision with which positions were occupied by means of horses, after the fashion most usual here. So accurately were intervals preserved, so well was the lie of the ground judged, that it was but rarely guns had to be moved when once unlimbered, the trails touched the ground just where they were wanted, and the detachments were free to get to work and begin shooting at once. Now I think such nicety as is here implied argues that the batteries must have practised much at that particular system of unlimbering, and that it was no very unusual procedure. That the "creeping" plan has many advocates in Germany I know, not only from what has been written about it of late in this country, but from the German military papers and magazines. Indeed, it is officially recommended in their regulations. What I suggest, however, is that the practice is less universal than is imagined, and that there are certain difficulties connected with it which have perhaps scarcely received sufficient attention.

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In the earlier phases of a battle, if time were available and the ground were favourable, I am sure every means of concealment should be made use of. "Creep" by all means, if possible. Keep under cover and lay indirectly, make screens, study the background, use the forward slope, and act as the circumstances justify your doing. Above all, endeavour to deceive the enemy and elude his observation. But you cannot any more tell a man what is best to do until you stand on the ground beside him, than you can dogmatize as to what formation his battery is to move in under all circumstances. I am only saying now what I am confident the majority of Field Artillery officers feel, and I do not believe that any prejudice against "creeping" or any other useful expedient, at the period of the engagement I have referred to, exists amongst them. But subsequently when you have to move in, determined to subdue the enemy's guns, or be destroyed in the attempt to do so, the conditions are widely different, and then there are objections to "creeping" which should not be lost sight of, if we are to nicely balance pros and cons.

Again, it is only in the case of the attack that we need discuss the matter at all. On the defensive, what was done would be a matter of time and opportunity, and every conceivable means of keeping guns concealed would, and often could, be adopted.

Further, it is only as regards the position from

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which artillery is going to prepare the infantry attack by subduing the hostile guns that we need compare the relative advantages of "creeping," or of bringing up guns by means of horses, or of laying from behind cover.

Positions taken up previously to this phase would be merely temporary ones for reconnoitring or other purposes and at distant ranges.

Between 2500-1500 yards, however, we may anticipate that the effect of modern shrapnel will be pronounced, and the cost of exposing men or horses has to be carefully examined. Now, at this stage of the fight, I think it may be quite wise to "creep" if the ground be hard and smooth and the reverse slope not unduly steep. Each detachment might then run its own gun up until the target were just visible over the sights.

You could act in that way on smooth turf, as, for example, on parts of the Berkshire Downs, and, if you do, the presence of your guns, until they open, will be unrevealed. That fact is quite well known at Aldershot, and on one position the old hands will even show you the exact stick to which the guns must be pushed. But the ground on the spot I have in mind is like a cricket pitch.

Consider, however, how infinitely more arduous the operation would be in a strange country! A commanding officer would then be in doubt as to how much or how little to go on before unlimbering. If he went too far, he might show the horses; if he were over-cautious, his men might have an

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altogether unnecessary strain put upon them. He would, in fact, have to take up two positions: one for unlimbering, and another for the guns alone. The French artillery endeavour usually to get behind the crest, and at their manœuvres in the autumn of 1897 I frequently noted the evils of a too rigid tendency to do so. Guns had often to be limbered up again after they had come into action, and had to be moved a little further forward, and that, too, under fire. Not only that, but when firing at an advancing line of infantry, all of them were repeatedly limbered up and taken forward, perhaps less than two hundred yards, in order that they might see their objective, which, as it advanced, became unseen from their original positions. Such short advances by artillery are notoriously detrimental, and are much to be deprecated. On the other hand, if, as has been suggested, men are used in place of horses, the steepness of the slope, or the nature and state of the soil, might render the task of man-handling guns most trying. I have not seen "creeping" practically carried out in Germany, but I have read views expressed in the "Militär-Wochenblatt" on the subject, and these difficulties are clearly by no means unrecognized there, so much so, in fact, that one school contends that while you are about it, it is better to adopt the hidden position and indirect laying altogether, and the last article I read compares these rival systems only.

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I am quoting from a German article when I say that this pulling and pushing policy is found to be most distasteful to the rank and file, and I do not think that what we have heard of it in England has given us a complete idea of what it means. The Germans are no stronger than are we, and they find that one gun detachment alone is not able to deal with the gun. Therefore, twenty men are harnessed to one gun, and half the guns are sometimes brought on by all the gunners, while the other half wait their turn. It reminds one of La Rothière and the guns on the ridge of Trannes during the bad weather of 1814. The men pull on a sort of "prolong" (Langtau), and I will translate[1] a criticism of this means of progression just as I came across it the other day:—

"The 'prolong' used for the purpose has several disadvantages; in consequence of its great length, the foremost men who pull on it must show themselves on the crest line in order to get the gun into the proper position. Besides, it is well known that a force of draught acts with diminishing power the further it is applied from the weight to be drawn, and that twenty men pulling on one rope do not produce double the power of ten."

The writer goes on to advocate two ropes in place of one, but the point I wish to accentuate is sufficiently illustrated without my following him further, since it must be clear to all that in this "creeping" system, if the horses are less exposed,

[1] "Militär-Wochenblatt," No. 4, 1897.

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it is so at the expense of the men, while the delay and labour involved can scarcely fail to often seriously interfere with the service of the piece, and the timely tactical application of the arm. In this country, on the other hand, we endeavour to bring as few men as possible under fire, and, except for the minute and a quarter that the drivers and horses are exposed, have only six men at the most with the guns of our Field Artillery.

Let us put the two systems side by side for a moment and analyze their claims to our favour. I will first refer you to page 10 of the "Annual Report of our School Gunnery" for 1896. You will see that the two methods were tried at Okehampton in that year. The gunners who pushed the guns into position on "a gentle slope and hard ground, free from boulders and heather" (under very favourable conditions, therefore), were exposed to view for one minute and fourteen seconds, while the horses and drivers which performed the same task were at a similar disadvantage for one minute and twenty seconds. The Germans, as I have shown, have found that on ground such as we would probably fight over, twenty men are needed to pull each gun into its place. The reserve of strength in horses is enough to enable them to always do the work on any reasonable ground in the same time. Therefore, if we accept the so-called German method as correct, twenty men would often be put on each of three guns and then have to go back to fetch up the other three,

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and you would therefore expose sixty men to view for two periods of one minute and fourteen seconds each, or, in other words, for two minutes and twenty-eight seconds. In the other system you expose fifty-four men (eighteen drivers) and forty-two horses for a period of one minute and twenty seconds.

The chances of loss are not then so very disproportionate, but the chances of effective shooting subsequently are. For—

"The fatigue entailed in the first case was very marked, most of the detachments were quite unfit for their duties for some minutes; anything like accuracy of laying would have been quite out of the question for some time." [1]

That last paragraph should give us pause.

I do not say that on occasions "creeping" may not be desirable, but it is not surely a system to be accepted as a normal one, when the deficiencies in physique of our Field Artillery gunners are considered, and it is one certainly unsuited for those occasions when guns have to intervene quickly and decisively in the combat, unless a stretch of smooth, hard turf were by some extraordinary good fortune to be met with.

I myself, four years ago, held up to admiration the achievement of some German guns who massacred three French batteries at Sedan, and I cordially agree with those who urge that no one but a lunatic would drive up in the open and un-

[1] *Vide* Report already referred to.

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limber under fire from a hostile artillery which had found the range, unless dire necessity drove him on. None the less, the picture of the destruction which would *certainly* fall upon a brigade division which brought its guns up to the crest of an intended position, in full view and under fire from a hostile line of guns, is sometimes painted in too violent contrast of light and shade altogether.

Let us analyze the situation here for a moment too. The attention of troops in action is always more or less distracted by the appearance and disappearance of hostile parties. Scouts, patrols, or stronger bodies of cavalry hover about, small parties of infantry appear, a gun opens from an unexpected direction; it is never quite the case of a cat watching a mouse-hole in a quiet corner of a room. Except under abnormal conditions, guns appearing as is suggested will frequently not be noticed for a few seconds after their arrival. The "Annual Report of the School of Gunnery for 1896," page 10, already quoted, tells us that the horses and limbers of a brigade division "bringing its guns up to the crest line of an intended position" will be exposed to fire for not more than one minute and twenty seconds. What are the chances against them? The same Report shows that the average time fourteen batteries at Okehampton took to commence firing "time shrapnel" was four minutes and thirty-seven seconds. And they did not arrive at what they thought was the correct length of fuse until

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six minutes and twenty-one seconds had passed.

I see that Von Rohne[1] has put the average time that German batteries take to range (einzuschiessen) at 4·6 minutes. I presume he calculated up to "time shrapnel," but it is not stated whether this was so or not. I am sure our artillery is efficient, and so, I believe, is that of the Germans, but, in the face of these figures, and allowing for the difficulties of a battle-field in a strange country, I do not think it is just to impute rashness to an officer who accepted such risk as is here indicated if he wanted his guns to be of opportune service, or to call his opponent anything but efficient, even if he did not, in the fleeting seconds at his disposal, hit a single man or horse.

Many batteries at the long range, if the light be bad, never really find the short bracket at all, even at Shoeburyness, in double the time quoted, and occasionally hardly a hit would be recorded to them were the friendly ricochets off the sands eliminated. You cannot confidently rely on a range-finder, even in peace time, and if you did, "the error of the day" would still have to be discovered. Nor do I believe that to measure distances on a map in an unknown country would often be feasible. It is all very well when you know the exact spot you stand on and the hill the enemy must occupy, as is the case sometimes on much trodden ground at our manœuvres, but

[1] "Militär-Wochenblatt," No. 4, 1897.

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without trial shots on unfamiliar ground, it will be more good luck than anything else that can give you a "target" at the first shot or two.

To teach batteries that they are to fear risking their safety when there is so little on the cards against them, would be as bad as to encourage them to recklessly or needlessly expose themselves in the open, where the limbers and horses would have to remain fully revealed to view. Batteries so trained would soon begin to think more of their own safety than of the general interests of the army, and would meet with the contempt which was heaped on some Russian batteries at Plevna (which I will mention in my next chapter), who plumed themselves on having done their duty and retired satisfied after they had lost three per cent. of their strength, while the infantry they should have supported suffered in some companies to the extent of sixty per cent. of their numbers.

But, when speaking of positions, I must not overlook those which are completely covered and from which indirect laying will be necessary. I believe that these will be extremely useful on occasions, but I do not believe that they will ever be used when it is possible, with a reasonable amount of cover or concealment, to lay directly. I am sure we have all seen occasions when we could have turned such positions to account, and certainly we should all be prepared to utilize them if need be, but there are very serious objections to

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them which are sometimes lost sight of by those who, in Germany especially, have taken them up with an enthusiasm which only a hobby can arouse. Theoretically, they are most fascinating, but in practice I fear would scarcely win so much admiration as they do on paper.

Their advantages are, I believe, well known to us all and are fairly obvious, but it is sometimes forgotten that it is not easy to change from one target to another when you cannot see either, or when the situation is altering, as it does in the course of a fight. You can very likely make excellent practice while your foe stands still, but you will not hit him at all as he keeps moving on to you, nor can you concentrate your fire as circumstances may demand.

Not only that, it takes longer to range. I will quote a few statistics I have found in the "Militär-Wochenblatt," which I mentioned just now. At some experiments quoted by Von Rohne, the well-known German authority on artillery matters, while it took batteries laying directly 4·6 minutes on an average to range on a target representing artillery, those which laid indirectly required 12·7 minutes to effect the same purpose. Moreover, when laying directly, a percentage of 7·9 hits per minute was attained, against 2·7 arrived at by using the "richt-fläche." I do not attach overwhelming importance to these figures, because they are based on only five series fired indirectly; but they are probably sufficiently trustworthy to show

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that the two methods can scarcely be regarded as equally efficient. It is impossible, without more experience than we have had in this country, to speak with anything like confidence, but it seems certain indirect laying will scarcely give good results unless it is possible for the battery commander both to observe and to command. To enable him to do this will need a very favourable *terrain*, and he will often have to stand on a wagon or limber in order to see. I notice that this is the view of many officers on the Continent, and it is with the object of helping the battery commander towards the fulfilment of his duties that the portable "observation ladder" has been introduced in some services; that of Belgium, I think, is one. I remember some years ago translating an account of one of those new-fangled adjuncts and much exercising the mind of a brother officer by doing so. He complained that of late he had been called upon to perform so many unexpected feats that he feared possibly he might some day be required to climb trees, if a hint so dangerous as my ladder were given to the authorities. I trust I shall outrage no sensitive feelings now I mention it again, and that I shall arouse no animosity if I bring yet another modern contrivance to notice.

I understand that the German "richt-fläche" does not meet with favour amongst those in this country who have tried it practically, as I confess I have not. I do not wish to advocate the particular one in use in Germany, and I am quite

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prepared to believe that our aiming-posts will do all we usually require more simply and more efficiently than it can.

But, nevertheless, I have myself felt the need of a "richt-fläche," and I should like to see such an instrument with our batteries.

I have seen two batteries of a brigade division brought into action against a target on which they could lay directly, but the third battery had a wood in front of it, and it could not therefore see the particular part of the target on which it would have been desirable that all three batteries should direct their guns. The configuration of the ground absolutely precluded any other position being taken up. Now you cannot plant aiming-posts on the tops of trees. You could give the guns the required elevation by means of clinometers, but you could not give them the necessary direction. It is in cases of this kind that, to my mind, an instrument is so valuable by means of which guns, when they cannot see the target, may be trained in a given direction, as they are on racers in a fort.

Everyone must also remember positions which were just too small, owing to an obstruction such as I have indicated, and on part of which guns had therefore perhaps to be put at reduced intervals, which might have been readily and safely taken up if some aid, such as I ask, could have been called in. I commend the notion I have in mind to those interested in artillery who

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have mechanical talents, and I am sure, if they can invent an instrument on the lines of the "richt-fläche" they will confer an immense benefit on our Field Artillery.

But, in speaking of positions from which nothing of the enemy can be seen, the moral influence which the uncertainty as to their situation, relative to the foe, may have on the *personnel* is a factor which must be reckoned with. Except in the very earliest phases of the battle, or under special circumstances, when natural features may render surprise or swift counter-attack an impossibility, it will be difficult for the men to escape that vague distrust which always paralyzes energy and vigour. They will be haunted by dark imaginings, and will perhaps think more of what may be than what is. In the letters of "Redan Windham," recently published, there is an excellent illustration of how such terror of the undetermined and unseen may cow men who have just displayed undaunted courage. Our storming-party carried the parapet of the Redan at the last assault, but no effort, no example could urge them to cross the interior space and drive the Russians completely out of the work. They had got into their heads the idea that it had been mined, and the suspicion of the potential danger was more terrible than the actual menace in their front. And yet it was afterwards discovered that the very spot on which they hung back was directly over the magazine!

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Not only, however, should we think of the inherent disadvantages of a position in the dark, but we must weigh the consequences of teaching men to seek safety in concealment.

It is to be remembered that artillery trained to keep at a safe distance from the enemy, and to drain the last drop of advantage out of its long range, has never fulfilled its *rôle* completely on the battle-field. The early portion of the American war taught us that,[1] and in 1866 the Prussian gunners, who did so much four years later, only performed their part in a comparatively feeble manner, because they were kept too much in rear. The incidents of the late war between Turkey and Greece show the same tendencies, and the same disappointing results. All these considerations should be pondered over by anyone who may be bitten by the possibilities long range and improved *matériel* have placed before us. We ought all to be able to fire by indirect laying, and we will sometimes find it a most valuable aid to us. But that it can ever become the usual method of fighting guns I do not believe, and I doubt greatly whether it will ever be more than an unusual one on the battle-field.

[1] "The long range of their artillery was, and has been on many occasions throughout the war, especially at its commencement, a disadvantage rather than a benefit to the Federal army. Both generals and troops preferred using long range arms to coming to close quarters, consequently much time and ammunition were wasted in firing into woods and at imaginary bodies of the enemy."—"History of the American War," by Lieutenant-Colonel Fletcher, vol. ii. p. 129.

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And now, having devoted some time to the various sites where guns may stand and the manner of bringing them there, I want to say a word or two as to changes of position. I think I ought to dwell on this point, because there is a mistaken notion prevalent amongst officers of the other arms that guns must always move close in when they support an infantry assault. Men who have not had experience at practice often do not realize that the fire of a battery is almost, if not quite, as destructive at 2000 as 1200 yards, and that, under favourable conditions, it is very effective indeed up to 3000. On the other hand, artillery officers, in order to escape the criticism or censure of imperfectly informed umpires, or to avoid the reproach which attaches to lukewarm support, occasionally leave positions from which their fire is effective in order to move to others from which the chances of a slightly enhanced effect are not sufficient to compensate for the loss of time incurred while the change is being effected, or for the destruction amongst men and horses which may be suffered during its progress. It occasionally comes to this, that a battery does not get credit for lending aid unless it gives visible and tangible proof of its assistance by a personal appearance on the scene.

Now you must move on if the advance of your own infantry masks your fire, and therefore you will often be compelled to shift your ground, but as long as you can produce the effect required by

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means of shells there is no need to expose men and horses in making an advance simply to display your activity and readiness. I do not mean to say that artillery is not to be prepared "to go in," as Prince Kraft says it must, but I do mean to say that what was necessary with an artillery that relied on common shell twenty-eight years ago may not be so urgently required now, when we have such vastly improved guns and ammunition at our disposal. Later on I mean to add something that will show that I certainly am not going to recommend over-caution, but at the same time I have too much respect for modern shrapnel to undervalue its powers. We are all almost tired now of quotations from the Franco-German war, but the German artillery then much distinguished itself, and the broad features of its handling will, I believe, bear me out in what I have just put forward.

At the battle of Mars-la-Tour-Vionville, on the 16th of August, in which the German artillery earned undying fame on the Rezonville Plateau, we find, according to the German official account, that the German batteries hardly ever changed their positions, and their mark only under special circumstances. The French artillery, on the other hand, were in constant movement.

"On their side fresh batteries were incessantly appearing, now here, now there; but only to disappear as promptly as they came, and to leave

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to others, at other points, the continuance of the struggle." [1]

The superior accuracy of the German fire may have rendered such constant manœuvring as necessary as the presence of the large French reserve of guns made it possible, but there can be no doubt that such tactics are not to be imitated, and that their outcome was certainly most unfortunate.

Again, in the remarks from the same source on the battles of the 14th, 16th, and 18th of August round Metz, we find the following notice of the German artillery tactics :—

"Conspicuous in the first place, in contrast to former times, is a great change in the employment of the German artillery. Placed at the head of the marching columns, it appeared with the foremost on the battle-fields, mostly preparing the great offensive blows. Fearlessly *holding it to the position which it once took up*, it may be said to have formed a solid frame-work to the order of battle, whilst the French batteries only appeared as an easily transferable force." [2]

I remember, too, the way in which some of the French batteries were handled at Beaumont. During the battle the French Artillery, which crossed the heights south of Le Fays copse, endeavoured by repeated changes of position to avoid the effect of the German guns, which were superior to them in every other quality but

[1] German official account. [2] Ibid.

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mobility; such efforts were entirely futile, however, for we find that they had eventually to retire from the field. I will not enter a more detailed account of this or other battles, nor indeed do I wish to repeat what must already be very generally known.

The experiences of the war of 1870 may be briefly summed up in saying that they particularly demonstrated the decisive superiority of the German artillery, and a closer examination will convince everyone that that superiority was due to the powerful shell fire its guns were capable of, combined with the able leadership that commanded them, and not to any evolutions or manœuvring on the battle-field.

The broad features of the artillery tactics of the victors stand out clearly and unmistakably. The guns occupied a forward place on the line of march. Concentrated in masses, they took up well-selected positions early in the day, and utilized the advantages they possessed in armament by remaining in them for long-continued periods, and wasted no time in hasty or ill-considered movements. They could have moved just as well as the French did, had it been desirable, or could they by doing so have enhanced the value of their fire. They *did* so when it was necessary to conform to the infantry, or to establish a success gained by them, but it may in general be said of their tactics that they were distinguished by the time the artillery remained in the positions selected for them.

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Another feature of the German manner of fighting, as it will surely be imitated by all other nations in the future, has an important bearing on the question we are considering. Their batteries were massed together in long lines. Now, it is evident that if batteries be scattered more or less singly among other troops, it may be possible to move a battery from one position to another during an engagement without the effect of the diminution of artillery fire, while it is in transit, being seriously felt. But to uproot a great mass of batteries, and by doing so to cause a cessation of fire on a large and noticeable scale, is obviously a very different affair. Such an undertaking would not be without an influence on the progress of the entire battle, and could not be entered on unless some corresponding movement on the part of the other troops demanded it.

One point more. During the final stages of an attack, should infantry cry out for the moral support your presence will bring with it, tactical, as opposed to technical, interests must be paramount. The requirements of a good position are practically never at hand just at the right moment, exactly in the right place. You must try and get your guns where their powers may most effectively be applied, and in these last moments that will often be on ground which you would not dream of occupying were your choice less circumscribed. We have heard so much of the crest line the forward slope, and the reverse

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slope, that it is scarcely dreamt of in the philosophy of some officers that we may have to go where there is neither crest nor slope at all, on our side, at any rate. General Maurice once pointed out that in 1870 the Germans usually fired up hill. No doubt they did, but at our manœuvres, if a battery be below its antagonist, it is sometimes too readily assumed (not by artillery officers, I think, but by those of the other arms) that it must necessarily get the worst of the combat. I have spoken with a man who went through all the Franco-German war, and he told me that the feature of the German tactics which impressed him most was the manner in which, if the need arose, batteries were pushed on to support the infantry regardless of advantages of site. The same thing is daily to be noticed at German manœuvres of the present time, where batteries, should they be called on to come *quickly* to the assistance of the other arms, are encouraged to get into action, no matter whether they can find what we term a *good* position or not. I do not mean to contradict myself, nor do I wish to advocate a revival of "bow and arrow" tactics, but I think, nevertheless, that a small hill acts too much like a magnet with us sometimes, and that men will waste precious moments and go out of their way to reach one, and find themselves, when they reach it, not quite where the situation called them. At the crisis I have in view it is a question of only a few batteries, and of the

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culmination of the fight, when the foe is absorbed with the infantry. At such a moment command and background and all the other desiderata should be sacrificed to timely intervention.

I will not weary my readers with a closer examination of a subject in which theory may revel. To enlarge on all we want and all we ought to have when considering positions, seems futile. We have so often all through to try and do the best we can under adverse circumstances that it is more confusing than anything else to insist on idealities which we can rarely or never hope to see realized. It is better that we should make up our minds that in military matters, as in most other affairs, a decision is usually the outcome of a compromise, that the best is often the enemy of the good, and that in this imperfect world neither men nor positions are of a "sealed pattern."

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CHAPTER VI.

AN OBJECT-LESSON FROM PLEVNA.

HAVING hitherto laid down the principles which guide us in utilizing our forces on the battle-field, and searched military history for examples of their practical and successful application, it may be asked why I devote a chapter to operations which offer little but negative evidence towards the elucidation either of artillery tactics or of its co-operation with the other arms. It is certainly more straightforward and agreeable to say how to do it than how not to do it; but the campaign of 1870 so well illustrates the former method, and has been so closely analyzed, that it is refreshing for a moment to leave its well-trodden paths and turn our attention to newer, if more forbidding, regions. Besides, it is certainly as profitable for purposes of study to dwell on failures as successes, if the causes at work in both cases be examined; and, finally, the expectations which the brilliant deeds of artillery in 1870 aroused were such that an explanation as to why they were not realized in a subsequent campaign is certainly called for.

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Something is undoubtedly to be allowed for the defective *matériel* with which the Russian batteries were equipped. Bronze field-guns with a muzzle velocity of only 1000 feet per second are scarcely such as we should care to rely upon in the face of troops armed with Martini-Peabody rifles; nor were fuses or projectiles by any means equal to modern standards. But we should go very far astray indeed did we attribute the miscarriage of the Russian schemes to deficiencies of armament alone. There were causes at work far more paralyzing than inferiority in ranges or trajectories, and it may be asserted that even the most modern guns would have failed to secure success where they were handled with so little appreciation of what the occasion demanded.

Technical are, in fact, far less deadly than tactical shortcomings. That is one lesson from military history which we should never lose sight of. A handful of men thrown skilfully on an opponent's flank may by a bold onset snatch a victory where a body with better weapons and ten times its strength may, if feebly handled, meet with a reverse. So is it where guns are concerned, and it would be a most pernicious creed which would let us for a moment imagine that mere mechanical contrivances or numerical strength can ever compensate for absence of sound general principles in directing the action of batteries. The opportune, if somewhat fortuitous application of two field-guns at the Alma pro-

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duced a decisive influence on the course of the battle. Two siege guns at Inkerman stemmed the torrent when we were well-nigh overwhelmed.

In the first two battles of Plevna, those which took place on the 20th and 30th of July respectively, the failure of the Russians may, however, be attributed to other causes than those connected with the handling of artillery. To attack a strongly-entrenched and well-armed foe, who is superior in numbers also, is always a very bold experiment, even though you may be able to count on your men being better trained than those whom they oppose. It is certain that a full and thorough preparation of such an assault by artillery fire is a *sine quâ non*, and no such preliminary was arranged for on these occasions. We need not therefore enter closely into an examination of these battles, but may pass on to the third assault of Osman Pasha's positions in the beginning of September, when the faults which had marred the previous failures had been recognized, when the numbers of the Russians, especially as regards guns, were preponderatingly great, and when it was deliberately resolved to rely in the first place on the support which a vast advantage in artillery might be expected to give.

Let us briefly glance at the forces engaged on either side.

According to Prince Kouropatkin, who was Skobeleff's chief of the staff, the Russo-Roumanian force, which was got together at the

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beginning of September, numbered 82,000 infantry, 11,000 sabres, and 444 guns. Of these twenty were siege pieces of powerful calibre,[1] and of the remainder about half were 9-pounders, and half 4-pounders. There were also with the Russians four siege guns taken from the Turks at Nikopolis.

Against this force Osman Pasha could, according to the same authority, only oppose 49 battalions, 26 squadrons, and 60 guns. He probably received reinforcements amounting to several thousand men during the engagements, and his force may therefore, perhaps, in round numbers be placed as high as 40,000 men with 60 guns. His position was very strongly entrenched, his men handled a rifle at least as good as any of that time, and not much inferior even to those of the present day, and his batteries, if few in number, were armed with Krupp guns, steel breech-loaders of eight and nine centimetres calibre, superior in range, accuracy, and mobility to the Russian field-pieces.

We thus see that the Russians had an immense superiority in artillery, in so far as mere quantity of guns was concerned, and that the inferiority in infantry which hampered them in the previous assaults had in September been changed into a preponderance in their favour. The divided counsels which mar almost all allied operations were, however, not absent from their camps, and

[1] 24 pounders of 6-inch calibre.

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were indeed magnified by the fact that Prince Charles of Roumania, who exercised the chief command in front of Plevna, was a mere figure-head, and did not possess sufficient weight or authority to amalgamate and weld together the energies of his subordinates. The Russian general Zotoff, nominally his chief of the staff, was, in fact, his mentor and the real commander-in-chief, and the difficulties of such a position choked the full expansion of the energies of a professional soldier. Moreover, the intelligence department of the Russian staff did not arrive at any true estimate of the Turkish strength, and General Zotoff was led to imagine that he had 80,000 Turks and 120 guns in front of him, whereas, as I have shown, Osman Pasha's force did not amount to more than half that total.

Nor were the Russian staff officers able to discover how the Turks stood with regard to supplies of food and other necessaries, and accordingly no clear estimate could be formed as to how long a regular blockade or siege would be likely to continue. For this reason it was determined to carry the positions by an immediate assault, and it is interesting to note that the causes which lay at the root of previous failures were correctly estimated. Thus it was recognized that the main fault had been in an incomplete preparation of the infantry attack by artillery fire. Sufficient time had not been allowed for the guns to do their work, and all the pieces available had not been made to tell.

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Like the enthusiasm of converts, the balance of opinion now swayed so completely in the opposite direction that it was resolved, with a well-meant but ill-considered prodigality, to devote not only hours but whole days to the first act of the new drama. The programme read speciously enough. The troops were to approach Plevna on the evening of the 6th of September, and seize positions at effective ranges for their batteries; these were to be secured against assault, and occupied by the numerous guns. A bombardment, which was to be as continuous as possible, was then to be commenced, and was to be increased in violence by a gradual approach of the guns, until the storming of the works by the infantry brought matters to a culmination.

To this tremendous bombardment no less than four whole days were to be devoted. But the detailed instructions lacked careful forethought. The assaults by the infantry were to fall on the southern side of Plevna, yet the actual point to be carried was not specified with sufficient exactitude, while another assault, which was to strike the Turkish works on the eastern side, was directed on the very strongest obstacles which the Turks had been able to prepare. Moreover, the Griviza redoubt, which was the immediate objective in that quarter, was not of vital importance to the defence.

I do not desire to enter into the general features of the fighting, but these fundamental errors of

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tactics were further aggravated by the fact that musketry fire did not sufficiently supplement the preparatory efforts of the artillery, and that neither infantry nor guns carried out that part of the programme which directed them to gradually draw nearer to the hostile entrenchments during the preliminary bombardment. We are more concerned now with the doings of the batteries, and accordingly I will pass on to speak only of them.

On the 2nd of September, General Zotoff had called together a council of war at Poradim to consider the best means of bombarding the works, and he unfolded his scheme, which suggested a prolonged, uninterrupted and heavy cannonade on the entrenchments and redoubts themselves, such as might shatter them materially and cause heavy losses to the garrisons. Now we all know that the effect of Field Artillery on earthworks [1] is but very small, and the Russian gunners knew it too. They objected that the course suggested would lead to an expenditure of ammunition such as they could not afford, and that the guns themselves would be irreparably injured by the strain such a continuous fire would throw upon them. It was then proposed as an alternative that a sufficiently heavy fire should be poured on the works to render them untenable by large reserves, that their armament might be knocked about, and, above all, that

[1] "The damage done was not more than could speedily be repaired."—Greene's "Russian Army and its Campaigns in Turkey in 1877 and 1878."

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the approaches to them from the enemy's side might be so swept with shells that reinforcements should not be able to make their way into them.

The members of the council, having considered these representations, agreed that it was not feasible to destroy the earthworks, but accepted the proposition for sweeping the approaches to them with fire. But I do not think they fully realized what such a proposal implied. It is easy to glibly speak of sweeping communications with fire, but, as a matter of fact, in this particular case it involved cannonading a space more than ten kilometres wide![1] And even then you could not be sure of searching out every place where the enemy might move.

Councils of war are prone to compromises, and compromises are fatal in warfare.

As a matter of fact, after all the discussion, neither this part of the scheme, nor that which provided for the dismounting of the Turkish guns by artillery fire, led to any good result at all.

But it was when ranges came to be considered that the most fatal misconceptions were exhibited. Some officers very truly pointed out that in the previous battles the guns had been held too much in hand, and the commander of the Artillery of the 4th Corps endeavoured to get General Zotoff to decide that fire was not to be opened from 4-pounder guns at ranges exceeding 1800 metres, or from 9-pounders at more than 2400 metres.

[1] That is to say, $6\frac{1}{4}$ miles.

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Unfortunately, however, other officers did not support this proposition, and the commander of the artillery threw the weight of his authority into the scales against it.

There was little confidence in the Russian camps, too, in the powers of their weapons, as against those of the Turk, and a sinister presage of failure pervaded the minds even of the artillerymen themselves. A workman who quarrels with his tools after he has botched his task may be a bad one, but he is not so hopeless as one who commences his labours by decrying them ere he has given them a chance. Saturated with this conviction of inferiority, the Russian Artillery commanders formed a battery from hostile guns captured in Nikopolis, and this reinforcement joined the army under the high-sounding designation of "the long-range Turkish battery." It was also to counteract the supposed inferiority in range of their cannon that the twenty siege guns were added to the field-pieces.

The baneful impression that their artillery could not compete with that of their foes was further aggravated by a pernicious dread of the mischief which musketry might do them. With regard to this particular form of nervousness, I may say that the gloomy prognostications which are occasionally indulged in during peace seem as little likely to be borne out in war as they are when results may be judged by hits at our practice camps. Certainly in the past, even when its projectiles

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were far less deadly, Artillery has been able to face rifle bullets, except at quite short ranges, with comparative impunity. The German batteries lost heavily, no doubt, on occasions, under the fire of the Chassepot, but not sufficiently so to prevent their doing exceedingly good work; and the French rifle of 1870, be it remembered, shot accurately up to 1500 yards. Some years ago at the R. A. Institution at Woolwich, General G. H. Marshall quoted the results of some firing with the new magazine rifle, which should give confidence to gunners in the next great war.[1] He said: "We find that 1830 rounds were fired during the four series (I have left out the 2515 yards series), and that there was practically no effect at all, except on the infantry target. I think with the lecturer that we should look from both ends of the range, and I do think that there is a good deal of unnecessary striving for cover from this fire (i.e. long-range infantry fire), especially when we find, as the figures tell us, that there is practically no effect."

I have no desire to depreciate the rifle, and I am sure that the effect of both guns and rifles will often be disappointing when those who direct them are fired upon themselves. I also freely recognize that batteries under certain circumstances may have to suffer heavily from the fire

[1] *Vide* report of lecture on "Okehampton Experiences," by Major A. J. Hughes, vol. xxii., No. 1, of "Proceedings of R. A. Institution."

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specially picked marksmen may pour upon them, and that it might be possible so to place such men that it would be difficult, if not altogether impossible, for artillery to dislodge them. The tribesmen at Dargai have just supplied us with a most salient example. But it was not a dread of that sort which shook the Russian confidence in 1877. They had a terror of musketry fire *in general*, and went into action with the feeling that they should not be able to face it. This gave rise to that pernicious custom of not allowing guns to approach to a distance at which rifle fire may possibly tell. It made batteries hang selfishly back in secure positions to the rear, from which they accomplished little, and lost nothing, except their reputations, while the infantry went on alone and suffered heavy losses unsupported. It made batteries limber up and go still further back as soon as a bullet or two found a billet, leaving their brethren of the infantry to perish, helpless and alone, at the very moment when they most needed a sustaining hand.

Another error which had far-reaching consequences was that the Russian Artillery leaders had imbibed the idea that it was mere waste of ammunition to fire on the network of entrenchments which connected the Turkish works. As though troops in such places could not be made highly uncomfortable if assailed by guns from positions away to the flanks! And thus it came about that during the assault all the force of the

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guns was expended on the closed works, while the troops lining the entrenchments between them were allowed to work their rifles without their aim being in the least disturbed.

Much was hoped for by the Russians from the twenty siege guns which they had brought up, but the ideas which coloured their views were somewhat more theoretical than practical, and the methods adopted for giving them reality were not clearly nor definitely thought out.

Neither did these leaders grasp their batteries firmly and intelligently as they should have done.

It was not contemplated by General Zotoff that these pieces should be brought into action at the outset, but rather that they should advance to a somewhat decisive range under cover of the fire of the field-guns proper. The officer, however, who commanded the siege guns thought that they should be placed in battery simultaneously with the others, and he urged his views so forcibly that he carried his point, and a salvo from his guns announced the commencement of the bombardment.

The following are the principal advantages which it was hoped would flow from such a use of them :—

The confidence which the Turks felt in the long range of their cannon would be shattered.

This result was not attained, and, moreover, it was fortunate for the Russians that it was not. Because but little serious injury was done to them

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at long ranges, while had their opponents reserved their fire from the 6th to the 10th of September for ranges well within the powers of their guns, far heavier losses would have fallen on the assailants.

It was fondly imagined that a large proportion of the Turkish cannon might be dismounted, and that then the capture of the defences would prove a comparatively easy task.

Here practice once more belied theory, for 60 Turkish guns opposed 400 Russian during four long days, and at the end of that time were still in a position to do terrible mischief to the columns of assault, which, be it noted, were unsupported by artillery fire at the critical moment.

It was thought that the siege guns would draw the Turkish projectiles upon themselves, and that thus the field artillery would be enabled to work comparatively undisturbed.

The Turks fell into no such error as this. On the contrary, they more or less ignored the siege guns, and concentrated their fire on the foremost field-batteries of the attack.

It was supposed that the siege guns might indicate to the others on what points fire was to be concentrated, by leading the fire with heavy shells, whose large bursting charges would mark the required objectives.

So futile an expedient was foredoomed to failure, and I may add that we are here confronted with one of the difficulties which must always

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stand in the way of concentration of fire in large battles. We have found it difficult even at Okehampton to get as few as three batteries to concentrate their fire quickly on the desired point. How much more arduous must the problem prove when all the guns of an army corps are in position? As I have said in a previous chapter, I believe hope only lies in the direction of a well-matured service of messengers, and a carefully thought out system of training. Rough-and-ready methods, such as the Russians here relied on, will always fail in the excitement and confusion of a great fight. So was it at Plevna; sometimes the large puffs of smoke were unnoticed, and often there were none at all to be seen, for the fuses did not act satisfactorily.

Finally, it was expected that the destructive effect of the heavy shells would facilitate the task of the assault.

We were given no chance of judging how far these hopes might have been justified, because through lack of good fire direction, the siege guns did not cannonade the part of the works which were finally assaulted (with the exception to some extent of the Griviza redoubt). I must add, however, that in spite of the disappointing results achieved, the feasibility of utilizing siege artillery in the attack of field entrenchments, and the benefits which might flow from such an employment of it, were, in the opinion of Prince Kouropatkin, not altogether belied. Enough was done

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to show that with good management such powerful pieces might prove sufficiently mobile to make a timely appearance on the battle-field, or even be equal to changes of position thereon.

And now let us follow the Prince's analysis of the artillery operations a little more in detail.

On September the 7th, at six o'clock in the morning, 15 batteries of Field Artillery and 20 siege pieces opened fire. An additional battery was brought up during the day, and eventually 140 guns in all were in action. Of these 56 were on the right wing, and 84 in the centre.

The bombardment was reinforced on the 8th by 11 more batteries containing 74 guns, and on that day in all 214 guns were at work, 86 being on the right, 108 in the centre, and 20 on the left wing.

No new batteries were brought up during the two following days on the right and centre, but two more were deployed on the left. All the 20 siege guns were concentrated in the centre, and 10 guns were moved from the left to the centre, in order that their fire might flank the point of assault chosen for the left attack. In all, on the 10th, 228 guns were in action; 78 on the right, 126 in the centre, and 24 on the left.

On the 10th the batteries of Horse Artillery belonging to the Cavalry division of General Losch Karev also took part in the fight.

On the 11th a special reserve of guns amounting to 78 on the right, and to 48 on the left, was kept

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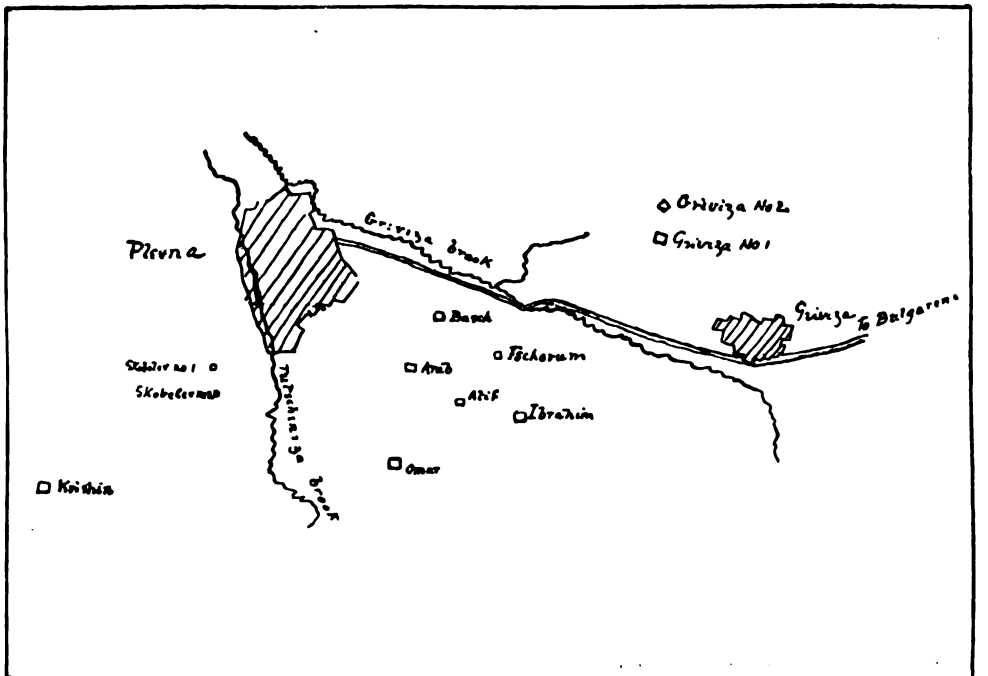
TURKISH WORKS ROUND PLEVNA.

September. 1877.



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in hand, and the services of all these pieces were lost to their side. In the centre all the guns were, however, turned to account. But the upshot was that on the day of the actual assault 186 guns were not placed in position at all.

The targets which were fired upon during the artillery preparation were, on the right wing, the Griviza redoubt, the entrenchments in front of it, and the Basch redoubt. In the centre, the redoubts Ibrahim,[1] Atif-Pasha,[2] Omar,[3] the entrenchments between the latter and the Tutscheniza valley, and also the redoubts Tschorum and Arab.[1] On the left the redoubts, Junus (better known as the "Krishin Redoubt"), Abdul and Redshi,[4] with the entrenchments which united them, were fired upon.

We find an astounding ignorance of tactical principles when we note the ranges at which firing took place. On the 7th of September the Roumanian batteries were placed from 2000-3000 metres from the Griviza redoubt, and 1400 metres from the most advanced Turkish rifle pits. The batteries of the 31st Artillery Brigade were 3600 metres from the same redoubt, while the eight siege pieces were 3800 metres from it, and 5000 metres from the camp at the Basch redoubt.[5]

[1] Known in Greene's account as redoubt No. 1.
[2] Close behind redoubt No. 1.
[3] Known in Greene's account as redoubt No. 10.
[4] Redoubts included in the "middle group" in Greene's account.
[5] The redoubt nearest Plevna on the east.

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On the 8th of September the Artillery fire forced the Turks to evacuate the advanced entrenchments, which were seized by the Roumanians, and a battery placed there within 1000 metres of the Griviza redoubt. The batteries of the 31st Brigade were pushed 1000 metres nearer to their objective.

On the 9th and 10th no attempt was made to approach nearer to the enemy, except when one section of a Roumanian battery made a rash effort to unlimber within 800 metres of the redoubt, and was compelled to retire.

The ranges at which the Russian guns in the centre were fought on the 7th of September were, in the case of the 30th Artillery Brigade, 2200 metres from the Ibrahim redoubt, and 2960 metres from the Tschorum redoubt; while the batteries of the 16th Brigade stood 2500 and 4000 metres from the Atif redoubt, and 3000 metres from the Arab redoubt. The batteries of the 5th Artillery Brigade were held so far aloof at first that on this day they could not fire at all.

Even the heavier guns displayed only an obstinate resolution to secure their own safety.

The twelve siege pieces which formed a battery in this part of the attack cannonaded the redoubt Ibrahim at a range of 4000 metres, and the camp at the Basch redoubt at 6000 metres.

A little more enterprise was evinced during the night of the 7th, and the batteries of the 5th Brigade were pushed forward and opened fire next

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morning at 2400 and 2800 metres. The others remained, however, much as before, but three light batteries were brought out from the reserve and opened fire on the new redoubt at Omar at a range of 1300 metres. One battery engaged the Skobelev redoubts[1] at ranges of from 3200 to 3860 metres.

On the 9th and 10th of September lassitude again set in, and the different field batteries remained in the positions already occupied by them, and made no attempt to get nearer to the Turkish works.

Neither did the siege guns seek new ground, but fired on the redoubt Ibrahim at more than 2000 metres, on the Omar redoubt at 2800 metres, and on the town of Plevna at 3000 metres.

On the Russian left wing, two batteries got into action on the red hill during the 8th of September and fired at a range of 3000 metres, and, in the case of the Krishin redoubt, at 4400 metres.

On the 9th they still occupied the same positions.

On the 10th two batteries ventured as far forward as the second ridge after it had been occupied, and from thence they fired on the Skobelev redoubts at a range of 2400 metres, and on the Krishin redoubt at 1500 metres.

I feel I have said enough to show that the objectives of the Russian guns from the 7th to the 11th of September were stretched along a line

[1] Immediately north of the third ridge.

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from the Griviza redoubt on the left of the Turkish positions to the Krishin redoubt on their right ten kilometres, or about six and a quarter miles, long.

And in addition to this a tolerably heavy fire was kept up on the Tschorum redoubt, and a somewhat less intense one on the Arab redoubt.

It is, therefore, clear enough that nothing like a concentrated or uniform direction of fire with the object of preparing the way for the columns of assault can be traced in the operations. When they were got into position batteries fired on various points of the hostile stronghold without any regard as to their relative importance, and something like half of them in fact wasted their projectiles on works which were never assaulted at all.

So much so that in the centre, where the assault failed, the collapse is directly to be attributed to the fact that on the 7th and 9th the Turkish position here did not receive a single shell.

On the right an immense expenditure of strength was bestowed on the Griviza redoubt without anyone having noticed that there was a second work a few hundred paces behind it which was strong enough to nullify the success obtained against the parapets which had been the object of attention.

The lessons of war were entirely ignored.

In place of opening fire impatiently it would have been wiser to have made a strong recon-

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naissance in force which might have disclosed the true nature of the defences and made clear the points on which the infantry should be directed. As it turned out, it was not until the 10th of September that the exact points of assault were determined upon.

Hitherto the artillerymen might shelter themselves behind the incapacity of those in general command, and plead that when the officers in supreme direction of affairs did not know their own minds it was impossible for their subordinates to have a clear policy. On the fourth day of the bombardment, however, the artillery leaders were in possession of definite information, and they failed even then as completely as before to work their batteries with a firm grasp.

Let us turn to the centre once more. Eight batteries here commenced by firing (without any object in view as it turned out) against the redoubt Ibrahim, but when it was announced that it was not that work but the Omar redoubt which was to be assaulted, they still remained helplessly where they were, although from thence they could not fire upon the vital point. Thus 64 guns looked supinely on while the infantry was being repulsed, and made no effort to come to its support. The batteries in question contained brave and efficient gunners, and it is no profitless speculation to argue that, had they been handled correctly, victory would have crowned the Russian efforts.

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It was also the fault of the artillery leaders themselves that the scheme of General Zotoff, according to which the fire on Plevna should be made to grow in volume and intensity as the bombardment progressed, by both gradually bringing more guns into action and by pushing them on to shorter ranges, was not carried out. It was their fault that no steps were taken to prepare new emplacements closer to the enemy's works into which guns might be pushed, and it was their fault that batteries were unlimbered at ranges beyond the powers of their *matériel.* Finally it was due to their teaching that a pernicious dread of musketry possessed the minds of their officers and men, and that in consequence, even when guns did venture to an effective range, they were hurried back in haste the moment a man or two was hit.

There was, however, another cause of failure at work which I want particularly to dwell upon, and bring home to the minds of officers, because it would have militated against success even had the faults already noticed not existed, and because no artillery fire, whether directed against troops in the open or in works, can hope to be really decisive unless it be free from it.

The fire which flows from guns which are intended to bring about a really shattering effect must be steadily kept up as a strong tempest, unremitting, pitiless, and growing in intensity until at the culminating moment it is at its very fiercest.

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A slow fire, especially if it be from the front, does not shake men's nerves. They can see the projectiles coming, have time to avoid them, and end by getting accustomed to them, and indifferent as to the danger which they bring. I think all the records of war teach us this, and that unless we can break the *moral* of the enemy, mere physical losses will not seriously affect him. It is for this reason that a concentrated fire coming from different directions is so effective. Men become bewildered, dazed, and positively paralyzed under such a visitation; they lose their coolness, aim badly, and forget the lessons of the practice ground in their nervous haste to reply to the blast which is turned upon them. Now, although the Russians had a vast superiority in guns, and had every facility for thus attacking their opponents, we find no traces of any such handling of their artillery as might make the most of its moral effect.

The campaign of 1870 had taught men to expect mighty results from artillery. On the 7th, when the Russian batteries opened fire, the whole army felt pride and confidence in them, and waited with no misgivings for the inevitable moment when their projectiles would reduce the doomed enemy to helplessness. From early dawn the gunners too vied with one another in generous emulation, and worked their pieces with an almost feverish energy. At about eleven o'clock the stream of fire became somewhat less violent, but more regular in its flow.

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When the tempest first burst upon them the accounts tell us that the Turks seemed quite confounded by its violence. In about half an hour they however recovered themselves, and began to answer in an energetic manner, and kept their fire up all day. But the extreme range at which the Russian pieces were fighting and their deficiences in ballistic power prevented their attaining any decisive effects, and although they had a superiority in the ratio of from 5 or 8 to 1, they could not silence their opponents' batteries. Towards evening, however, some guns in the Griviza, Ibrahim and Atif redoubts were put out of action, and the parapets and traverses were a good deal knocked about. About seven o'clock the cannonade slackened, and during the night it died away altogether.

The sun of the 8th saw all the dismounted Turkish guns replaced by new ones, and the spade, busy in the darkness, had repaired all the damage which the earthworks had sustained.

On this day the fire from the Russian right was rather weaker than before, but from the centre it rather grew in intensity, especially that which was directed against the redoubt Omar,[1] which the Turks had built during the preceding night. The Turks did not now reply so vigorously as previously. As evening closed in, the guns grew gradually silent, and but a few made themselves heard during the night. Again the spades and

[1] Called No. 10 redoubt in other accounts.

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shovels set to work, and in the security of the darkness, and the absence of the destructive shells, the shaken parapets were renovated and strengthened.

As yet the guns had effected but little, yet General Zotoff imagined differently, and thinking to give still more time for their destructive action to be developed, postponed the intended assault. Therefore on the 9th and 10th the cannonade was still continued. But the same targets were again fired upon at the same ranges; and no real effort was made to push the guns any nearer in.

Now the inevitable reaction sets in. A want of confidence in the skill of their leaders began to take the place of the enthusiasm which had at first animated the gunners; a deadly langour crept upon batteries, and their fire dwindled by degrees. On the side of the Turks, too, a sort of weariness was noticeable. During the 9th the Russian guns in the centre hardly fired at all. On the 10th those on the right tired visibly also. But few shots were fired after dark. The Turks continued to make their position stronger and stronger. The Omar redoubt, which did not exist on the 6th, formed a strong rallying point on the 11th, and behind Griviza No 1 a new redoubt on the 11th was able to nullify the efforts of the 3rd Roumanian division.

The same canker that destroyed the efficiency

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of the Field batteries was at work amongst the siege guns too. In the first place no clearly defined *rôle* was given them to fulfil, and secondly they were held back at too distant ranges. It would have been more risky but more politic to have attempted to dismount the Turkish guns by pouring on them a heavy fire from the numerous light field guns, which, if they had been brought into a range which would have allowed them to work effectively, would easily have been equal to the task. Artillery fire, especially on earthworks, as I have said, can only be effective when it grows stronger as the cannonade progresses, and is made to culminate in fury immediately before the assault is delivered. Thus the defenders are compelled to evacuate their parapets just at the critical moments. Far better would it have been had the siege guns not wasted their ammunition in bombarding redoubts on the 7th, 8th and 9th, which were repaired during the night when the fire ceased. But the most lamentable error almost of all was exhibited when the Russian batteries actually began to run short of ammunition before the time allotted for their carefully planned bombardment was over. On the 9th and 10th their fire, in consequence of this, rather slackened than grew. Many also of the guns gave way under the strain of the continued firing, and, to crown the Russian mishaps, the weather, which had hitherto been favourable, became broken and thick. It was clearly impossible to continue to

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carry on the cannonade, and in despair the assault was therefore arranged to take place on the 11th.

An error in technical knowledge may now be noted in the catalogue of ineptitude. To fire continuously at long ranges at high angles of elevation must do injury to light guns. If pieces must be elevated to the fullest extent, or if such expedients as digging holes for the trails to sink into be resorted to, the strain thrown both on the mechanism of the guns themselves and on the carriages which bear them is materially and dangerously increased. We need not therefore be surprised to find that the 3rd battery of the 16th Brigade, which had been firing on the 7th and 9th at 4000 metres, and on the 8th at 3200 and 3860 metres, could only bring four out of its eight guns into action on the 10th, the others having given way under the strain to which they had been subjected.

Similarly the 1st and 2nd batteries of the 2nd Brigade fired on the 8th and 9th at ranges of 4400 metres, and, according to the report of the commander of the 2nd battery, "it replied effectively to the Turkish fire, although it stood at a range of 4800 metres." The consequence of this firing was, that on the 10th these two batteries between them could only work six guns, and on the following morning it was found that yet another gun had succumbed. Artillerymen will know what value to attach to the word "effectively."

The 4th battery of the 30th Brigade, which was

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firing at 3200 metres on the 7th, could only use six of its guns on the 11th.[1]

It is in fact probable that this firing at excessive ranges on the part of the Russians ended in dismounting more of their own guns than of those of their opponents!

I will revert from technical to tactical matters now.

The question of how the Russian Artillery supported their brethren of the other arms must be examined, and it is to be feared that it will scarcely come well out of the investigation. So much has been said on the subject in many text-books, that it is a mere truism to assert that it is no disgrace to lose guns, and that their loss is often amply compensated for by the damage their stubborn resolution has inflicted on the enemy. But I may add a rider to the effect that batteries which have really accomplished great things in war have almost always paid dearly in the lives of men and horses for their success. Artillery must not fear losses any more than do the other arms when it is called upon to act decisively.

Prince Kouropatkin indeed has contended that, always supposing no gross tactical error to have been committed, the losses which bodies of troops sustain in action is a direct measure of the determination and courage with which they have

[1] These details are taken from the account of Prince Kouropatkin as translated by von Krahmer.

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borne themselves. An Artillery which loyally and unselfishly lends its aid to the Infantry, will suffer a somewhat similar proportion of losses. Many a German battery in 1870 could prove its self-sacrifice by such a reference to the list of its casualties; but a different state of things is to be found in the records of 1877.

In all the fighting round Plevna, the losses sustained by the Russian Infantry were very much relatively greater than those which the Cavalry or Artillery suffered. In many cases individual companies, battalions, or detachments of the first arm left half their numbers on the field. At the actual storming of Plevna on the 11th of September, the Cavalry and Artillery lost from two to four per cent., while their brethren suffered to the extent of twenty, forty, or even fifty per cent. In other words, one arm was made to pay about ten times as severely as the other two. It is scarcely an extravagant assumption, therefore, to assert that the Infantry received from the Artillery only one-tenth of the assistance which they had a right to count upon.

Where guns and horsemen have done their very best to co-operate, the records of the hospitals have borne unmistakable testimony as to their earnestness, and huge gaps in their muster-rolls have pleaded eloquently for due recognition of their devotion and loyalty.

The Russian gunners themselves also admit the truth of the contention that losses may be accepted

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as a measure of duty well carried through, and with a strange disregard of proportion avail themselves of it.

In the journal of a certain battery (the 5th of the 16th Brigade) the following words, Prince Kouropatkin tells us, are to be found:—

"The losses incurred bear testimony to the fact that the 5th battery fulfilled the *rôle* allotted to it on the 8th." Now, if we examine the casualty return, which was so full, it is said, that the batteries were justified in having turned and gone back before the enemy, we shall find that the 4th, 5th, and 6th batteries of the 16th Brigade incurred the following losses during the 8th of September:—

	Killed.	Wounded.
The 4th battery had ...	...	1 officer 6 men
„ 5th „ „ ...	2 men	1 „ 7 „
„ 6th „ „ ...	...	... 3 „
Total	2 „	2 „ 16 „

There were about 600 men of these batteries in the front that day, and therefore we see that the loss incurred in general was about three per cent.—or six per cent., if we assume that only 300 men were actually fighting the guns. The case is even worse than I have stated, because at the moment when the word was given for the batteries to retire, they had not suffered to the extent these figures indicate.

Now, on the 8th of September there was with these guns an infantry regiment (the Kaluga

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Regiment) whose attack they were to have supported, and whose retreat they should have covered. During the fighting on that same day this gallant regiment lost 11 officers and 689 men, which represented a loss (if we allow for the losses previously incurred at Loftcha) of thirty per cent.; while certain individual companies lost as many as sixty per cent. In the face of these figures, what becomes of the assertion of the gunners that their losses showed that they had done their duty?

People are always prone to make their duty square with their inclination, but never surely can self-analysis have been more untrustworthy than here?

Yet we are told that the men of these batteries had fought well on other occasions, and in justice to them we must attribute their failure here to mistaken and feeble leadership.

An examination of the total losses incurred by the artillery tells much the same tale. Fifty batteries lost between from 150 to 200 men, killed and wounded, or in other words each battery lost from three to four men, or about one for every day's bombardment. As many as eight men were lost by individual batteries, but these losses were due to no steps having been taken to make epaulments or gun-pits, which under the circumstances of the occasion would have protected the detachments, and for the construction of which there was ample time.

Thus we see that the sources of the failure on

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the part of the Russian Artillery at Plevna can be traced clearly enough, and that they are found to lie deeper than in mere deficiencies of *matériel*. The whole spirit and instinct which animated the direction of the guns was contemptible, and the best weapons would have been useless when the tactical notions of those who led them were so mistaken. The guns failed because they did not deserve to succeed, and the story of their inefficiency, in place of being avoided by Artillerymen, should be read and pondered over frequently, so that they may at any rate know, when next their arm is put to the test, what pitfalls are to be avoided, and what hopes are vain.

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CHAPTER VII.

THE CO-OPERATION OF INFANTRY AND ARTILLERY.

If in this chapter I approach a well-worn theme which has been written about and spoken of unceasingly since the war of 1870, it is because a doubt as to how best to attack a foe in position seems still lurking everywhere, and that opinion, as regards the last phases of an attack, with no recent great war to solidify it, is still largely in a state of flux. During the last few months discussion has been more than usually active. In France General le Joindre has just written "Tir de Combat Individuel et Collectif," a book dealing with battle formations and fire tactics. In Germany numerous articles in military papers betray uncertainty, which the newest books on tactical matters scarcely allay. In our own country we have had Colonel Hime's most carefully thought-out and valuable paper on "Infantry fire formations"; while last, but not least, many must have read with interest the little pamphlet on "Preparatory Battle Formations" by Major-General Bengough. The few works I have

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named, out of many, are but examples of an astonishing activity of thought, which is even more strongly evidenced in the articles and letters that flood our military magazines and papers. Yet no one will admit that the last word has yet been said. It is not in fact possible to attain finality, nor desirable that we should do so, because the conditions of the problem keep varying as armaments are improved, and the circumstances of the moment must in any case have an altogether predominant voice before anything in the nature of a scheme is formed.

But if in abstract discussions certain signs of doubt and uncertainty are visible, nothing of the sort appears when modern tactics are exhibited in concrete form at manœuvres. The factors in the problem of the attack may be represented by indeterminate quantities, or they may be allotted values which we may regard as arbitrary, but we can be sure that in the end they will all be made to work out the same answer, namely—success. Success, victory, triumph, achieved finally perhaps with the circumstantial pomp of former years, is a dominating characteristic of deliberate attacks both at German and French sham fights, until occasionally to attack seems to have become synonymous with to win.

Indeed I think the general who ventures to adopt a defensive *rôle* is made to appear a little unfashionable, lacking style and dash, and somewhat of a slow coach.

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We see some light sparring at first, the artilleries engage, and fate seems for a brief period to swing in the balance; but very soon the tiresome delay is over, if the guns opposite are not silent they ought to be so, and then we often find the tide of advance flowing forward irresistibly, until, pent up and accumulated in the main fire position, it inundates the defence in one culminating wave of destruction.

"Redan Windham" used once to say that there was nothing so unlike a real battle as a sham one. I believe everyone feels to-day that in spite of many salutary changes and vast improvements during recent years, his sarcasm is still as true as ever. We cannot reproduce the slow development of a battle, because there are many considerations, besides a desire to introduce realism into manœuvres, which govern us, especially in this country, where the comfort of a voluntary army has to be considered. To bring a field day to an end within reasonable time, progress must often be prematurely developed, and if the general onlooker is astonished occasionally by what he sees take place, he does not know that subsequent criticism places the situation in its true light.

But whatever the subsequent decision of umpires may be, the tendency of what we see being done in all countries is to give a general impression in favour of the tactical offensive, and bearing in mind our traditional mode of fighting

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and the example of the great leader who so repeatedly demonstrated the advantage of a different attitude, I think I may appropriately dwell on the difficulties which are often left out of sight or ignored.

Those difficulties are in truth so great that many soldiers are realizing that our present day tactics are still merely in a state of transition, that infantry are drawing nearer to artillery, while cavalry are still indispensable to both. It is because infantry, endowed with long range fire, may perhaps endeavour to do at one stage what they had best leave to the guns, and that at another the guns may strive to intervene where they had better leave room for more rifles, that I have ventured into a region where countless footprints would seem to warn me off. And in discussing the action of infantry, I may add that I am endeavouring to represent some continental ideas as well as those of my own countrymen, and desire rather to stimulate study and investigation than to formulate any new or startling views in the direction of dogmatism or hard and fast recommendations.

I will commence by assuming that the advanced guard has succeeded in learning something as to the force before it, that a careful reconnaissance of the hostile position has been made, and that too by the officer in supreme command. I cannot avoid thinking that sometimes we see amongst ourselves a tendency on the part of such an officer

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to keep somewhat too far to the rear and trust to the reports of others. I believe he must go ahead and see for himself in modern war just as was the custom of the great leaders of the past. Napoleon invariably placed himself as far to the front as he possibly could before he made his dispositions; his ideas on this subject are very clearly and decisively expressed in his letters to his brother Joseph, amongst those lately published by Baron Thiébault. Some of my readers will remember how mercilessly he there upbraids his brother: "You should have bivouacked with the skirmishers of your advanced guard; that is how I made war," and so on to the same effect in language most unbrotherly and arrogant. When the huge hosts of the Continent meet, in these days of long ranges and wide intervals, it is not possible for one man always to see with his own eyes, but we have not had, and are not likely to have, experiences with such vast armies, and there is still scope for personal energy and activity on the part of our generals.

It will be more than ever difficult under the conditions of a modern battle-field to subsequently correct dispositions originally faulty, and therefore I do not think the necessity for a very careful and thorough reconnaissance can be too strongly insisted on.

But there is a special reason for it as regards artillery. Guns are nowadays pushed on far ahead of the main bodies, and I believe there is

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a distinct danger with regard to that in several respects.

Firstly, the batteries may be too eager, and may prematurely enter on a struggle with superior forces in which they may be so mauled that they will not subsequently be able to adequately cover the attack of their infantry which is so slowly plodding forward far behind. We have an example of such an error in the over rash manner in which the batteries of the IX. Corps were handled at Gravelotte, and we know that the loss they then sustained was not commensurate with the effect on the general course of the battle which they produced. Secondly, a battle may be brought about which was not intended to be fought, as was the case at Wörth, when the sound of cannon precipitated matters in a manner against the wishes of the Crown Prince. Thirdly, the deployment of a long line of guns without strong support may give an opening to an enterprising hostile cavalry, which it may turn to excellent account. For all these reasons a general should endeavour to control the action of his guns as long as possible; should make it subordinate to the comprehensive scheme he has in view; should judge if possible for himself, and not relegate the handling of so important a weapon to a subordinate, however capable.

But now, in spite of my strictures on the progress of a sham fight, I will precipitate matters myself, and suppose that the cavalry and horse

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artillery have drawn off to the flanks, and we will hope that these two arms will be left there together to utilize their opportunities under the eye of the cavalry commander, who must now be given a more or less free hand.

It will also be necessary, if we are to thoroughly probe the problem we are dealing with, to assume fairly open ground and a frontal attack.

It is an easy way out of the difficulty to say that you will take advantage of cover. When advancing you would no doubt turn all advantages the ground may offer to the best possible account, but it is to be anticipated that your opponent will have chosen his line of defence so as to present as little favourable a terrain for you as possible, and you have no right to count beforehand on it greatly aiding you.

We will also put the chances of a flank attack for the moment out of sight. With small bodies of troops manœuvring with that object in view before an enemy is a far simpler matter than where army corps are engaged; the bodies must often then converge on one another from distant starting-points, and the strategic element asserts itself. At Königgrätz and Sedan the meeting of great masses on the battle-field was successfully carried through, but we may have to wait long for another Moltke and another Königgrätz, and in hands less capable than his, such combinations may end less triumphantly than they did under

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him. Besides, every attack on a large scale must ultimately develop into a frontal one, because the reserves of the defence will turn to face it and will have time to do so owing to the large arc on which the turning movement must be made.

The attack having been decided upon, the artillery will become engaged, and while it is struggling with the opposing guns there will be ample time for a careful organization of the infantry advance.

It may again be remarked that, while no rigid and pedantic adherence to the original orders need be insisted upon, forethought must now be largely exercised, even as far down in the hierarchy of command as battalion leaders. It appears quite certain that the galloping about of staff officers, adjutants, and messengers will not be posssble in a modern battle, that there can and ought to be little of personal command on the part of seniors, and that it is therefore most essential that orders and instructions should be carefully thought out and composed at the outset. The absence of interference and personal direction on the part of the higher leaders is the characteristic of foreign manœuvres which has perhaps most impressed visitors from this country, and is worthy of our imitation. The allotment of objectives, the division of frontage down to individual battalions, the precise distribution of the several lines, and such other broad outlines of the scheme can now be dealt with. Further, there must be impressed on

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everyone that, once launched, the attack is to be carried through. That must be the governing idea in the minds of all when loosed from the control of superiors. Amongst all nations there is unanimity that this must be the guiding spirit, there must be no misgiving, no open instructions, no room for independent action here. Without a doubt the next war will be full of surprises, but they must be met as circumstances offer opportunity, and the sternest resolution and most unflinching determination must be concentrated in enforcing the one iron rule "go on" from the moment when the first skirmisher now starts on the enterprise before him.

The exact distance at which the deployment is made and the precise nature of it must be left to circumstances. But I may say that you will usually have to get into fighting formation when you come within about 1800 yards of the enemy's position, unless the configuration of the ground offers exceptional advantages for a nearer approach in compact formation. It is just as great a fault to deploy too early as too late. Loss of time and control must be weighed against the chances of a loss of men. The screen of skirmishers or battle patrols, or whatever you may call them, in front will feel the way and will help you to decide.

The problem which at this moment is puzzling many heads now first presents itself. There is only one way in which even the very bravest troops can hope nowadays to beat their enemy,

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and that is by attaining a marked superiority of fire. That again can only be accomplished by what we may call mechanical means, the weight of artillery fire in the first place, the precision and intensity of rifle fire being added to it somewhat later.

Moreover, before infantry can hope to effect any decisive result, they must get within 500 or 600 yards of their goal, and superiority of fire is after all governed by the number of rifles in line.

To turn an enemy out of a position you must therefore at the culminating moment be in superior force. Yet there is a long and perilous path, a mile long perhaps, in front of you before you can gain the vantage-ground which you intend to make your main fire position, and you will almost certainly be losing men all the time you traverse it. Even should you be in great superiority when you start, will you still be so when you arrive at your destination?

The books make it quite a simple matter; they all say, the artillery having subdued the hostile artillery, the infantry go forward, or words to that effect. But it would add an element of realism to manœuvres, and I am sure would make us all think what this artillery combat really means, if a delay were made occasionally now, and a general informed as to what he might expect from his artillery, whether it was a preponderating power or the reverse, and if he were asked to modify his

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dispositions in accordance with the information given him in the same way as is done at a war game.

Supposing that it became apparent that his batteries were not superior to those on the other side, would he still go forward, and, if so, how? Or would he attempt to draw off? I do not think it would be usually anything but extremely hazardous to attempt the latter, unless he can find a defensive position to take up comparatively close in rear, and he will therefore probably always press on in spite of the fire which the guns are sure to turn on him.

But as a basis for argument here we may assume that the result of the artillery duel has not been very decisive one way or the other, and that, though your batteries may have been found inferior in power to those of the defence, they are still able to co-operate with the infantry. Even in spite of an avowed inferiority in artillery it will be best usually for the infantry to continue their onward march. The guiding spirit already referred to should always be paramount and all-compelling, while secondary considerations must remind you that if the attack be held back, the guns of the defence will have nothing to distract their attention from your batteries, and in a prolonged artillery duel pure and simple the latter must eventually become silenced. To avoid that contingency, and to draw the hostile shells partly, at any rate, away from the guns, it will be better to

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send the infantry on, and then under the lessened strain your batteries may be able to refit and collect their shaken energies, to throw themselves once more into the scale at the decisive moments later on.

I believe that during this advance the infantry should keep on forging steadily ahead, and in spite of losses should abstain from firing, leaving fire entirely to the guns of their own side. You must halt and aim deliberately, perhaps lie down, to hope for much effect at such ranges as I have in mind, while in extended formation fire discipline is difficult. In the phase of the battle I am discussing, you must enter on a fire fight at a disadvantage, and unless you know the range accurately you will probably not make many hits, for the presumption is that the enemy's infantry supports and reserves are under cover, and you can only have a good chance of hitting men in his shooting line. Meanwhile he has several lines behind your foremost one to catch any wild bullets.

The guns may offer a better target, and we know what "Infantry Drill" says with regard to them; but in this connection I must add a word, nevertheless, which will place your difficulty there clearly before you.

A gun detachment consists of nine men; four of these are actually working the gun, two are behind a wagon or limber setting fuses, and are to some extent covered by the ammunition boxes, the remaining three are lying down in reserve

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under cover. A battery does not feel the effect of loss at all, therefore, until three men per gun in the firing line have been disabled, or, in other words, its powers will be in full play until the guns have incurred a loss of 50 per cent. But one man can set fuses and supply ammunition without any sensible diminution of effect, and the loss, therefore, of even another man per gun would not produce much result. The guns are practically none the worse for being shot at, even by artillery; they have no nerves; and are less affected by the personal element than any other arm. My readers will understand, therefore, that while moving forward, there can scarcely be any hope of subduing hostile artillery by fire at ranges other than those that are at any rate medium. It will pay better, I believe, to think only of utilizing cover and pushing on, and leave firing, except under special circumstances, severely alone.

There are some authorities on the Continent who attach immense importance to the enhanced properties of both guns and rifles. To such, the attempt on the part of infantry to advance usually without firing almost up to decisive range will seem like a return to purely shock tactics. The answer to their objections is that if the men are allowed to halt and fire standing up, they will present a most vulnerable target to their enemies, and we may be sure that the accuracy of their fire will be very small. On the other hand, if they are allowed to lie down and endeavour to

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aim with nicety it may be difficult to make them go on again. Therefore, while infantry is supported by artillery fire, its chief endeavour should be to push in, if possible, to somewhere near decisive range.

There remains the objection that it is extremely difficult to prevent men from returning fire, and that it encourages them if they are allowed to do so. If the Old Guard could be trained to advance with ported arms in the teeth of case from artillery and musketry, which at the very short ranges involved were as deadly as anything which we can imagine, modern soldiers can be taught to do the same.

No losses incurred in recent war are as heavy as what were endured without flinching even in the time of Frederick the Great.

During the attack of the Grey Knoll at Sohr, the Grenadier battalion Wedel lost 10 officers and 301 men out of a total strength of 12 officers and 390 men. In the assault at Kesselsdorf the Grenadier battalion Münchow lost 5 officers and 371 men, or 80 per cent. of its strength. At Zorndorf from one-half to one-third of the forces engaged were killed or wounded; and yet Frederick taught his men to advance at a deliberate pace without returning a shot until they were within perhaps 50 yards of their opponents, while we know that it was his ideal that no fire whatever should be delivered until that foe had turned to fly.

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But there is this considerable difference in the circumstances of then and now, that whereas formerly the frightful slaughter did not occur until the last moment of the assault, and only lasted for a comparatively brief period, when the men, locked tightly together in several ranks, had scarcely time to notice them, and were bound together by an iron discipline which held them perhaps in greater dread than did death itself; modern losses must be endured for longer periods and in formations where personal influence and authority are unable to reach individuals.

And moreover, while formerly the fear of death had to be overcome in order to enable a man to close in personal combat with his foe, discipline has now to exert all its resources to carry him to a place where he can effectively shoot at, but is still a long way from closing with, his enemy. Until that vantage-ground has been gained, and he has by fire power borne down his opponent's courage and resolution, he cannot hope for victory. A line of rifles wielded by men of cool fortitude is impregnable. That was proved many a time in 1866 and 1870. But we need not go to foreigners for examples, our own experiences in the last few years have sufficiently taught us that this is so, and fanaticism, great numerical superiority, and courage altogether indifferent to death, have, in their last stride it may be, but certainly and inevitably none the less, yielded to the stern logic of a flat trajectory.

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If any one can be found to still doubt that, let him note how the two nations who have had most experience both insist on the power of fire with an emphasis which is unmistakably evidenced not only in their regulations but in the example they give us at manœuvres.

Those who have seen the great rows of guns wedged in between the thick shooting lines of infantry, the utter disregard occasionally shown to all the precepts of the drill-book in order to get them there, the complete indifference as to the exposure of men and horses in the final phases of the fight—those, I say, who have seen all this must realize that it has only one meaning for us. We may think such tactics unreal, theatrical, impossible, but they are the deliberate outcome of vast experience and of unexampled study of military science, and they tell us this, that you must accept all risk and all loss when you mean to drive an attack home, and that every yard of front must be made to carry as many shooting machines, be they guns or rifles, as can possibly be got there.

We know that, if you reduce the normal intervals between guns by half, you may expect to see your losses increased fourfold. It is certain that the teams of artillery must suffer terribly if exposed to fire at decisive ranges, and, as I will explain, it is not always desirable or possible to fire over the heads of troops in front of you. But one and all these considerations are habitually

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thrown to the winds when at foreign manœuvres superiority of fire is demanded at the decisive point, or, in other words, when to break into the enemy's line at all costs is the determination of the leader.

Yet in comparing the tactics of the past and the present we must remember that the necessity for studying economy in life should be more present to the mind of a modern general than to his predecessors, because the effect of rifle fire has become directly proportional to the number of rifles that can be placed in line. Formerly the development of fire governed formations, and all through the history of fire-arms we find so close a relationship between the rate at which the infantry soldier's weapon could fire and the formation in which he stood that it can be reduced to a mathematical formula, as has indeed been just lately done by Colonel Hime.[1]

In the 16th and 17th centuries infantry were drawn up ten deep. Why? Because it took so long to load the fire-arms of the period that to keep up a continuous fire it was necessary for the first rank to fire, file away round the flanks and load, while the second rank did the same thing. Each rank in turn performed the same evolution, and finally the original front rank was again in its proper place, and ready to fire when the tenth had cleared its front.

[1] "Stray Military Papers." Longmans, Green and Co. 1897.

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Improvements in fire-arms had reduced the number of ranks in the time of Gustavus Adolphus to six. At the beginning of the 18th century four only were needed, and successive improvements enabled Frederick to use but three. The third rank was never worth anything except to support by its presence the other two, and in 1808 Wellington broke through all received traditions, and the regulations of the Horse Guards, which tried to hamper him, and, when he got his head in the Peninsula, fought in two ranks only.

It is due to his clear-headedness, his confidence in the courage of the British soldier, that this formation, which gave us an immense superiority in fire, enabled us to beat the French in the Peninsula and the Russians at the Alma.

But whereas formations were then studied to develop fire, not to minimize losses, of late, when all nations have been obliged to fight in lines of single men in order to get the most out of their weapons, and are all pretty much on an equality, the problem as to formations still survives with reference as to how the effects of hostile fire may be most reduced.

An injudicious formation does not, as of old, directly reduce your fire effect, but it does so none the less in a different way, because it may cause you such heavy losses that the number of your rifles subsequently available in the shooting line will be diminished.

We find, therefore, in all countries various

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theories and schemes put forward, all intended to facilitate the traversing of the wide zone swept by the guns and rifles of the defence.

And turning again to military history it is very noticeable how the experience reaped, perhaps at a heavy cost at the outset of a campaign, has taught men to modify their formation, and attain equal success at a diminished expenditure.

At St. Privat the German Guard Corps lost 307 officers, 7923 men, and 420 horses, and at Sedan only 25 officers, 424 men, and 190 horses, and yet had certainly no smaller share in the success of the latter battle than it had in that of the former. Similarly the III. Army Corps of the Germans in the battle of Vionville lost 310 officers, 6641 men, and 677 horses, while the whole army of Prince Frederick Charles, in which it formed one out of four corps, lost between the 4th and 31st of January, 1871, during almost daily actions, including the three days' battle of Le Mans, 229 officers, 3721 men, and 426 horses, or about half the loss one corps alone incurred on the 16th of the previous August.

Such statistics might be added almost indefinitely to prove what will nowhere be contested, that faulty formations at the commencement of a campaign have frequently led to slaughter which it was quite possible to avoid.

To discuss here the question as to what formations are least vulnerable would lead me far from my object, and I own that I think that until we

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have had more experience it is a somewhat futile one. I may say, nevertheless, that it seems more essential to keep men under control than to avoid loss, while it is more easy to derive benefit from the undulations of the ground in small flexible columns than in line or rank entire. Such formations as those recently put in practice at Aldershot manœuvres, namely small columns, composed preferably of sections moving by "fours" at extended order interval, appear well adapted to combine elasticity of movement with complete control, while they retain the power of forming rapidly to the front, and opening fire in single or double rank. They also render formation to a flank to meet cavalry easy, and facilitate, too, a change of direction in the advance. Whether or not they are less vulnerable to artillery fire than an extended line is a question which will best be decided by experiment and experience on active service, and until we have had, as I believe we are to have, the former, it would be rash to pronounce a definite opinion. I am sure, however, that a line is easy to range upon, although the effect of one well burst shell would not be so disastrous as if it burst in front of even a light column such as is suggested. But whether we use columns of sections, as do the Germans, or move in fours, it must always be remembered that the same formation will not be applicable to the whole field, nor to all the circumstances that may occur. We must leave the matter of formations

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to the captains, and it is in regard to these that the lower officers will find most scope for the exercise of ingenuity and discretion.

If there be any choice open to us, however, I may say that it would appear usually judicious to make the supports overlap the flanks of the skirmishing line, and for this reason—The depth of effect of both artillery and infantry fire is such that bullets passing over one line are very likely to hit another in rear, while again there is a distinct tendency for men to aim rather for the centre of the opponents' line than for its flanks. There is also less danger of being hit by projectiles which have missed the first line if you are behind its flanks than behind its centre. It is, further, better to have the supports behind the flanks furthest from the guns, should the artillery be on one flank of the attack, because the batteries should safeguard the flank nearest to them while the other will often be *en l'air*, and also because the further flank will be more secure from the effect of shells fired at the guns.

To revert to the matter of fire—Napoleon said, "l'arme à feu est tout; le reste est peu de chose," and if his words were true at the beginning of the century, they are ten times more so at its close. The arms, then, that must decide the issue of the day are those which act by fire, and especially must the action of artillery, the arm which has no power except through fire, be favoured.

Guns can do nothing unless left for some period

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in a state of *rest;* the infantry, on the other hand, must ever hold before it the idea of *movement.* It only halts to recuperate for another advance, its goal is the interior of the enemy's position, and it cannot gain the victory until its presence there has driven out the defenders. Clearly, then, it should be the object of the artillery to secure unbroken progress for its comrades' advance, and their endeavour, on the other hand, should be so to move that the batteries may remain at rest to carry through their duties. The two arms are working together with a common end in view, they must co-operate so that neither may interfere with the other.

It is time then to look into this matter of co-operation and to add a word with regard to it.

Much of what I have to say may seem mere truism, platitudes that are obvious to everybody, and are unnecessary to touch upon; yet in war it is simplicity which is valuable, and simplicity is difficult. If I dwell on the need for both arms fully understanding one another, and sometimes may seem to desire the infantry to conform to, rather than influence, the action of artillery, it must be borne in mind that the destructive effect of artillery has curtailed the freedom of movement which batteries formerly possessed, while their increased mobility and greater range will cause the main body of the infantry to find them already in position before it arrives on the scene. The guns, therefore, must at first form the framework

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of the line of battle whatever their subsequent employment may be. If their range is to be fully utilized they *must* be brought up into position before the infantry, to which they are attached, arrives. We also know that their effect is much enhanced if employed in masses, which may concentrate their fire on certain definite parts of the hostile line. These are the reasons why it has become necessary to work them all as much as possible under one hand, and why divisional generals sometimes complain that they are bereft of their batteries. If any other rule prevailed, when several divisions formed an army, the action of the guns would lack combination, positions would be seized and occupied without reference to the interests of the whole force engaged, and the ground available for guns would not be parcelled out with the greatest advantage or with the economy that is so essential.

I need not also add that it is a very undesirable thing to alter positions which batteries have already taken up. When once they have become what may be termed stable, in five or six minutes they will often have found the range, and will be settling down to a deliberate cannonade. If they are ordered to move, their horses will have to be brought up into the fire, there will be considerable risk of loss amongst them, while, when the new position is reached, the whole process of getting into action and ranging will have to be begun over again.

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Occasions may arise, however, when it may become necessary for them and some of the troops near them to change front, and then it is important that the infantry should avoid getting behind them, or they may be struck by shells intended for the batteries.

For the same reason it is very essential that the reserves of the attack should avoid assembling behind a line of guns. A spur or crest line will often form the artillery position and may afford tempting shelter to a brigade still in compact formation.

I remember in 1893 at the Swindon manœuvres seeing a brigade thus massed directly behind and not more than 200 yards from a brigade division in action. The general officer in command of it was ordered to move at once, and was naturally eager to do so the moment he realized the risk he ran. I saw precisely the same thing done at the manœuvres on Salisbury Plain this year. Every shrapnel which burst over the batteries would have made havoc amongst the masses below; in war the first shell or two would no doubt have caused both brigades to leave the spot, but even one shell would bring heavy loss in ranks so closely placed together, and the error would perhaps have cost many lives and produced a very bad moral effect before the men were engaged at all. I firmly believe that just the same mistakes and just the same procedure we see at all manœuvres will at first be visible when we find ourselves at war in earnest, and therefore

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I have called attention to a matter which some will think hardly worthy of a reference.

If, however, it is unwise to get behind artillery, it is, in the earlier stages of a fight, equally so to get in front of it. Foreigners think nothing of firing over the heads of their own troops, and often place their batteries in two tiers, and no doubt we must sometimes do both, especially later on in the battle. For all that I should much prefer not to fire over my friends' heads, just as I know they will dislike the process, but more particularly would I dislike to do so during ranging, and for this reason.

We have only one projectile now, the shrapnel. In order to cause it to travel safely in a limber box it is provided with two safety pins. If you fire it with both in, it will travel and act like a solid shot; if you pull out both pins it will burst in the air at the point you set it for, or failing that it will do so when it strikes the ground. If you only pull out the percussion pin it will not burst until graze. I should further add that all fuses are carried set to burst at 500 yards from the muzzle.

Now consider the situation.

A battery when finding the range only wishes the shells to burst on striking the ground, therefore the man loading only pulls out one pin, the percussion one. But supposing him to become flurried and pull out the time pin in error, or that the jar of discharge breaks the pin, then the shell

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will burst in the air about 500 yards from the muzzle, and the ground will be swept by a shower of bullets up to 1000 yards from the gun. On the other hand, infantry lying down within 600 yards of a battery may be endangered by a shell bursting prematurely in the bore and acting like a round of case.

I do not say either of these dangers is a very imminent one; nevertheless there they are, and I have seen both the mishaps, and especially the former I dwell upon, occur at practice to an extent that teaches me that they should not be ignored.

The worst possible effect on infantry is produced by even slight damage inflicted in the manner I have indicated; we have that on the authority of foreign officers who have witnessed it, and on that of officers in our own service too. I heard Sir Redvers Buller say at Okehampton in 1893 that in the China War some of the lead coating that envelops the shells of our Armstrong guns fell amongst his men, and that the effect was most disconcerting to them. The other day an officer who had seen the same sort of thing happen a year or two ago in Burmah, told me he had found it impossible to get his men to go in front of the guns; yet the German artillery had frequently to fire over their infantry in 1870, and Hoffbauer tells us that in all the battles round Metz instances of their doing so occurred.

When guns are finding the range, however, it does not seem necessary to go in front of them,

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and after ranging you will be quite safe 600 yards from their muzzles.

It will be well now to touch upon another point which is of extreme importance. We know from the story of how the Russian attacks at Plevna died down, that guns not carefully instructed may fritter their fire away on portions of the enemy's position not going to be seriously assaulted, and may leave the really decisive spot unshaken, or even not fired upon at all. The place where the breach is to be made by them should be communicated to batteries directly a decision is arrived at, and the strictest watch should be exercised that there is no misunderstanding on the subject. Here an attempt at realism is quite feasible at field-days, and we should always make the most of it.

Again, there is another way in which infantry and artillery on active service might aid one another which we sometimes overlook in peace time. It is a small thing, a mere matter of form at manœuvres, but none the less ought we to practise it so that a habit, which will come as a matter of course to us in war, should grow up. There is no range-finder like a shell, and indeed I gather that infantry will have none other to rely upon. Guns that have been some little time in action will usually have got the range pretty accurately, and when the lines of the attack pass them they should always inquire as to the range which is being fired at, and avail themselves of the information when they halt to fire. These two simple

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observances will, at any rate, tend towards making the two arms appreciate their mutual interdependence, and will help towards linking them together.

And when the guns are given their objective the advance of the infantry should be directed so as not to mask their fire.

It is not to be expected that men advancing upon their enemy, and absorbed by what they see in their immediate front, will of their own accord pay much attention as to whether they may be in the line of fire of their guns or not. It therefore requires a great deal of skill and practice to keep the infantry advance in the right direction, while it is even more important that the batteries should concentrate their fire on the chosen part of the hostile position. We have the evidence of Prince Kraft, a man who saw much of modern war, to guide us here, and it is most explicit and distinct.

He warns us that it is a very difficult matter to make good later on an error in the original direction of a line of advance. Infantry move but slowly, and the necessary corrections will entail a considerable waste of time, and probably a very regrettable loss of life.

At field-days and manœuvres there is very little difficulty, and the procedure is quite simple. When the firing lines threaten to come across the front of the guns the artillery commander can send a message to them to incline away from them. Certainly he can do so, and very often, perhaps, he does do so, *at manœuvres*. Even there, however,

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it is not always feasible to send away a really trustworthy and competent man, and an officer is not to be spared from his proper duty with his battery. But we have an interesting illustration from Prince Kraft as to what it is like to ride forward from the flank of an artillery mass in action to that of a firing line also engaged with the enemy, and must acknowledge that it cannot often be possible to do so.

He tells us that he saw the feat accomplished once by (the then) Lieutenant von Roon in a reconnoitring action at Satrup on the 10th of February, 1864, and that then "the hail of bullets which fell round him on the snow showed clearly how seldom such an effort could succeed."[1]

At the great fight at St. Privat we know that Prince Kraft was himself twice compelled to recall some skirmishers who had pressed forward prematurely, because they masked the fire of his batteries, and he describes his experiences as being so unpleasant that he was astonished to find himself coming back alive, while his horse was not equally fortunate. He goes on to say that it will, as a rule, be necessary to give up the idea of sending any orders to a firing line which is fired on itself by the enemy. It must be given its instructions before it is sent forward; subsequently the lessons of 1870 tell us that it can only be influenced by signals, and can only be pushed forward by reinforcements reaching it from behind.

[1] Fourteenth Letter on Infantry.

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When we consider what the situation must be like in front of two forces engaged with one another in the last stages of an attack we must feel that his words are very weighty. How tremendous the storm of fire that beats the ground is likely to be we will appreciate from a little incident which happened at the battle of St. Privat which I have just referred to. When the Guard was engaged with the French riflemen a flock of sheep, startled at the commotion, galloped across its front. They were every one of them shot, and the Guard made a hearty dinner off them the following day. To ask men to rise and move to a flank under a fire such as is evidenced here is to demand too much from human nature. It would indeed be in all probability impossible to get your order obeyed, and if it were obeyed, half your men would be killed while making the movement.

On the other hand, we may learn how disastrous it is for infantry to mask the fire of their artillery, and thus have to do without its help at the last moments of an attack, from numerous instances in military history, but especially so from the experiences of the XIth and Vth Corps of the Germans at the battle of Wörth. When the French right was assailed twelve batteries on the hill of Gunstett supported the attack of the XIth Corps. These silenced the French batteries opposed to them, and then turned their energies to shaking the French infantry, a task which they also successfully

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accomplished; but when the Germans eventually reached, as they did, the crest line of the enemy's position they masked the fire of their guns, and were not adequately supported by troops in reserve. A counter-attack was made upon them by less than half their number of Frenchmen, and unsupported by guns, and disorganized, as they were more or less by the efforts they had made, they were driven in confusion from the position they had just victoriously gained, and would in all probability have been swept across the Sauer, but that in their retreat they again unmasked their guns, which, turning their fire once more on the counter-attack, brought it to a standstill. Very similar were the experiences of the Vth Corps, but in that case the batteries did try to go on to a second position, though they were unable to find one.

I do not say that the masking of the guns in these cases was to be avoided; I only quote the illustrations as showing how necessary it is to avoid doing so, if possible, and of what may be lost if the two arms are unable to co-operate throughout with one another.

But I bring it forward for another reason too. The artillery in the first illustration I have quoted was to blame for not sending some batteries forward with the infantry. I believe it would have been difficult to find a position for them, or perhaps, as the attack seemed to carry all before it, it was considered unnecessary to

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move, but at any rate we learn from the episode that in order to escape becoming masked, guns must often follow the progress of their comrades, and that their task is not ended even when they have crushed the hostile batteries, and shaken the infantry of the defence. A second position from which they may fight in the closest alliance with their infantry is necessary. The exact moment for their movement would, it seems to me, depend on whether the infantry had drawn most of the fire of the enemy upon themselves or not. Once this has occurred, if the artillery advance is well carried out as it will be by echelons, I do not believe the loss in horses will be so great as to bring it to disaster. It is not easy to get men who are excited to change their aim rapidly from one target to another, and if they do so quickly they do not adjust sights or aim accurately. But at whatever price, the guns must go on sooner or later, and must, if need be, at immense sacrifice get into action again if possible about 1200 yards, not nearer, but, for choice, not greatly more, from the hostile line.

Now, to carry out this co-operation, the infantry at one time looking to the guns for fire and itself only thinking of pushing forward, yet endeavouring to aid the artillery by not getting in its way; the guns again going ahead under the understanding that the fire from their comrades will draw off the attention of the enemy and facilitate their progress; all this demands an intimate

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association between the two arms, and a sympathetic feeling between them. Such close understanding is the fruit of much practice together and of a genial appreciation of the idiosyncrasies of either arm. Starting from the secure basis thus acquired, the principles underlying the combined action of the two will always be recognized even when the exigencies of a field-day or battle in earnest may compel men to alter methods to suit a particular situation, or break the letter of the law while acting up to its spirit.

It may be asked why I recommend guns to venture so close inside the effective range of modern rifles as I do. My reason is this. You cannot, I know, possibly improve on the destructive effect of shrapnel fire at a range of, say, 1500 yards. But very often, if you keep even at that comparatively short artillery range, it will not be easy to avoid the danger of which I have just spoken, the becoming to some extent masked by your own infantry. Moreover, at 1500 yards or so you scarcely see so clearly where your shells are bursting and what effect they are producing, as you will at a somewhat shorter distance. At 1200 yards, again, you would usually be able to fire with confidence as regards the danger of not hitting your friends, and you may hope to keep up your fire on the point to be assaulted until the very last minute before the rush is made. From that range, in fact, you might usually completely fulfil your mission, and I do not think that you

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would need again to press still further in; not at any rate until the defence was visibly shaking and crumbling under your fire. The teams otherwise would, we can scarcely doubt, so suffer in the transit that the guns, or many of them, would not succeed in reaching the new position at all.

To take up two positions, one at some 2500 yards and the other at some 1200 yards, would be as much as we have a right to count upon the majority of our batteries being able to do, and as regards mere hitting the target, we can do that with absolute certainty from the shorter range.

Moreover, much as both infantry and artillery may dislike it, towards the close of an engagement the latter may often be compelled to shoot over the heads of the former. Now, if the guns are at 1200 yards or so from the enemy's position, and the infantry is established in its main fire position some 500 yards from it, it is in no danger. Because it is far enough from the guns to be safe from the effect of a shell bursting prematurely at the muzzle or breaking up in the bore, and as the enemy's position will, we may feel sure, be on somewhat elevated ground, there will be no danger at such a short range of shells that are intended for opponents striking friends. Moreover, the infantry will be under the highest point of the trajectory of the projectile.

The guns need not cease firing the very moment the final rush takes place; on the contrary, a very rapid discharge of all of them continuing for a

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fraction of a minute will give a culminating blow that may finally shatter the cohesion of the hostile line.

How important it is that the fire of guns should rather grow than diminish at the supreme moment of the day we know from military history. If their fire is suddenly stilled the defenders will suspect what is about to happen, will emerge from the cover behind which they have perhaps been crouching, and will ply their rifles with renewed energy.

It was thus that our battalions met the imposing advance of the French columns in the Peninsula and at Waterloo, it was thus that in spite of an immense preponderance of artillery against them the Turks beat the Russians back at Plevna.

Except on the ground of moral support I do not therefore recognize the advisability of guns seeking to get within the zone of decisive rifle fire. But occasionally a weary and well-nigh worn out line of attack may need the powerful fillip and encouragement which the sound of guns in the midst of it will produce. That such moral support is a factor to be reckoned with no one can doubt. Some years ago were published the reminiscences of a Prussian artillery officer during the campaign of 1815. One passage, where he tells how his battery drove up into the firing line of the Prussians on our left at Waterloo, greatly struck me. The infantry received the guns with a cheer and shouted with delight, "Here come our gallant

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twelve-pounders!" The same warm welcome greeted guns many a time during the war of 1870, and I will quote Prince Kraft once more where he says, "There is something very encouraging and comforting to the infantry, when at such critical moments they hear their own guns thundering close at hand. Only those who have heard the cheers with which at such moments the infantry receive the batteries can fully form an opinion as to the moral influence which artillery fire exercises on its own infantry." It is true, in that particular passage he is not advocating the presence of guns amidst the firing line, but many times in the campaign were the German guns thus placed, and you will always see them in the same position at present at both French and German manœuvres. Artillerymen must then clearly recognize that when the situation demands it they must be prepared to try and sustain their comrades, not only by their fire, but by their presence, hopeless as such an attempt may theoretically appear.

There remains, however, a stretch of ground, if we assume that the defenders have made the most of their chances, not less in all probability than a quarter of a mile, to be crossed before the goal is reached, and here we are face to face with a weighty problem of modern war.

How is that space to be got over? The second line will arrive having also probably suffered loss, and it will be weary too. Can you expect tired

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men to face a heavy fire over such a distance at a late hour of the day? The demand is a large one, but it is discounted somewhat in practice because it is not the slightest use to attempt the final rush until the defenders are visibly demoralized by fire, until they have ceased to show over the defences, walls, buildings, or other cover which they hold. They must be cowering down to get away from shells and bullets, and have acknowledged their inferiority in fire before you attempt to seize their position. If that be not the case the assault will fail, but if all fire that can safely cover your final charge be brought to bear, it will not fail, and, moreover, you will probably lose far fewer men in it than at any other period of the fight. That is the lesson which we may draw from the history of the past. Patience will bring victory, but if you assault before the enemy has been demoralized by fire, he will again emerge from his cover, will meet you with fresh vigour, and the attack, however bravely made, will collapse.

And how if it do collapse?

I have always thought that passage, in which the drill-book,[1] deviating for once into language almost picturesque, likens the main fire position to a parallel at a siege, a particularly happy one. A modern battle will probably often assume the character of such an operation; you must make a breach in the enemy's line by sheer destruction in the one case just as in the other, and then when

[1] "Infantry Drill," 1896, p. 133.

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the breach is declared practicable the storming party will be launched. But in the siege the issue will be decided most probably in the early morning, in a great battle not till the evening. In both, in case of a reverse, the ground you have gained already must be held by your reserves, they must ward off the inevitable counter-attack if your foe is equal to one, and you must try again, perhaps next day. If the French right had not been turned at Gravelotte, the battle would have been renewed again with daylight, from where it came to a standstill on the 18th. Battles, even before the breech-loader, often lasted more than one day —Aspern, for example, and Ferozeshah, while Leipzig and Gettysburg continued for three.

And the possibility of night operations towards placing large masses of men under cover of darkness into position to make a fresh attack at dawn, is recognized in the German regulations. Not only men, but guns, because, if your assault fail, in nine cases out of ten it will be owing to your artillery having been beaten down, and being unable to adequately support it. In the night it may be possible to refit, replace, or add to batteries, and at dawn the work will have to be begun over again. This undoubtedly appears to me a direction in which night operations in the immediate presence of the enemy might in the future play a prominent part, and I refer to it, because in my opinion it will be as impossible to carry a well chosen hostile position without that

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superiority of fire, which is brought about chiefly by an overwhelming preponderance in artillery, as to capture a fortress or entrenched camp without a battering train.

It has been objected to the universally accepted scheme of tactics, which starts from the basis that the artillery has overpowered the opposing guns, that you cannot base principles on a main factor which is a matter of uncertainty. Germany and France have both very powerful artilleries, and which is the better we cannot know until the battle between them is over, but we in this country must look on the problem with less confidence than they because, although we hope we may in a few years have them, we have not as many guns per 1000 rifles to start with as our neighbours, and have no adequate reserves behind. It is not in any case of merely academic interest to ask what would have to be done in a case where an attack had to be carried out without artillery, because a brigade or some such body might, in the course of a great action find itself compelled to assault some particular locality where guns were not available to support it.

During the attack on Le Bourget on the 30th October, 1870, such an incident did occur when two battalions of the "Franz" regiment had to attack over 2000 paces of open ground without any assistance from guns.[1] The officer in command sent forward the whole of his first line,

[1] Prince Kraft, 10th Letter on Infantry.

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which consisted of two companies,[1] in thick swarms of skirmishers, and made them run in 300 paces at a time alternately by wings. After each rush the whole of the wing which made it threw itself down, and found cover amongst some high potatoes. There the men recovered breath while the other wing made its advance. The needle gun, I need not remind my readers, had no aimed range beyond 600 yards, while the French chassepot was accurate up to 1500. No fire was opened until the leading wing got within effective range of its weapon from the village, but then the men began to shoot lying down. The whole scheme of the attack had been practised and thought out beforehand by the officer commanding the "Franz" regiment, and the manner in which it was put in practice provoked the admiration of all the officers who witnessed it. It was thus carried on until the village itself was reached, and the battalions in the advance to that point suffered no loss at all. In the subsequent struggle in the streets they lost very heavily indeed, but the manner in which half of the line of attack appeared and disappeared in the high potatoes seems to have quite puzzled the French and disturbed their aim. Of course they were also very imperfectly trained soldiers, while the smoke of their rifles hung a great deal about them and obscured the view. Still, the example in view of the bloodless character of this long

[1] That is to say German companies, each nominally about 250 strong.

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advance over open ground is full of interest and instruction, although we cannot in these days of smokeless powder build much hope upon it.

That is one way in which the aid of guns might be dispensed with, but speaking generally, if without artillery, and unable to get near your opponents by surprise, or by a skilful use of cover, or if superior in numbers, by a flank or enveloping movement, there would be nothing for it but to try and develop fire effect analogous to that of the shrapnel, by putting a large number of rifles on what would have been the artillery position and supporting your attack by volley firing. The attempt we are discussing would, of course, be out of the question unless you had a vast numerical superiority, or the quality of your troops altogether surpassed that of your opponents. An immense expenditure of ammunition, too, would be required, and a distribution of fire in depth to reproduce the deep effect of the shrapnel would have to be resorted to. When under cover of this long range rifle fire, the first line of the rest of the force had established itself within decisive range of the enemy, the reserves might again assume their proper *rôle* and seek their natural position.

I may mention here a novel suggestion which, as it is intended to benefit infantry engaged with artillery, as these reserves might be, appears not unworthy of attention and perhaps experiment. General le Joindre, who was formerly director of

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the French School of Musketry, and now commands one of their infantry brigades, in a little book he has lately written, has produced calculations as to the power a French knapsack, packed according to regulation, possesses in resisting the passage through it of a shrapnel bullet. Since these calculations are based on the remaining velocities of French shrapnel bullets and the resisting power of a French knapsack, I need not enter on them here, but they carry with them the authority of Colonel Langlois, a well-known French artillerist, whose book, "L'Artillerie de Campagne en Liaison avec les Autres Armes," some of my readers will be familiar with, and, according to them it seems that at 1500 yards no shrapnel bullet would be equal to the task when the shell burst more than about 15 yards from the knapsack. The French knapsack is large and very easily taken off, as every one who has attended French manœuvres must have noticed when he saw every French soldier relieve himself of it during the shortest halt. Such an one placed upright would afford very considerable cover, and the idea appears to me full of suggestiveness. Of course we should need full experiments to guide us before a confident opinion could be formed; but if experiments showed the feasibility and value of the arrangement, an infantry soldier would possess a means of partially protecting himself against artillery fire which would always be ready to hand. At St. Privat the French infantry did actually thus

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shelter themselves, as has been related to me by an officer who saw the knapsacks left in position after the battle. We know that the cover afforded by so low a protection can be but small against a shrapnel bullet, but it might be made to augment other fortuitous cover, and therefore the idea seems worthy of some consideration, although it would involve a change in the manner in which our men now carry their packs.

So far, in dwelling on the attack, I have dismissed the cavalry and horse artillery with very little ceremony. But in the next chapter I will offer some opinions as to the action of those arms on the battle-field itself, for it will be better that I should not further lengthen a chapter already long by entering on a subject more easily treated by itself.

If, however, I may be allowed a final word, I should like to add something with regard to which I have not said anything hitherto. When the last word has been said as to ranges and artillery and formations, and the difficulty of getting men across the last stretch of ground, the one factor which never alters, and which always has been, and always will be, the determining one in all warfare, the personal element, namely, remains to be reckoned with. Weapons and equipment, speaking within limits, do not win victories. These are the fruit of personal effort and exertion, and are chiefly brought about by the influences which raise the mind above the body. The highest

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form of self-denial, the loftiest subordination of his interests, of his health, of his life, must be called for and exhibited by the soldier at the supreme moments when he forgets his individuality, and loses all other consciousness save the one ardent desire to go on and win with his comrades.

Discipline is the lever we utilize to lift a man thus above himself, and discipline is more necessary in our day than perhaps it has been in any other. To produce the highest discipline some mightier aid, some more powerful incentive than mere fear of his superiors, or desire for a little more pay or promotion, is needed. All a man's better instincts must be appealed to, all the worthier motives which sway our human nature must be called out. The traditions of the service he belongs to, the deeds of the regiment he has joined, his pride in them, his regard for his comrades, his respect for his officers, these must supplement the austerer virtues of a sense of duty and a wish to fulfil thoroughly the task he has been called upon to do. It is feelings such as these, engendering also, as they will, a sense of self-respect and emulation, which go to build up what we term *esprit de corps*, a motive power which, in all ages, commanders have taken pains to foster and utilize, but which civilians sometimes seem scarcely to understand. The Tenth Legion loved Cæsar, the sailors of the *Victory* wept for Nelson, the Old Guard died for Napoleon, because all these and many another great leader, too, looked after

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and cared for their men, identified themselves with their interests, sympathized with their feelings, and by bright example compelled respect and admiration from those they led. I believe in our regimental traditions, and, above all, in our British officers we possess a weapon more potent than the newest invention of the most scientific gunmaker. The regiment or battery with the highest *esprit de corps* will look the best, will move the best, and will fight the best. Such is the lesson of our military history, and we need go no further than the late Tirah campaign for more than one illustration of this eternal truth.

Let us then do all we can to cherish the traditions and privileges of our regiments, and when the crisis comes we may feel sure that our men will more than be equal to the occasion, animated by the associations in which they have been brought up, borne onward by a generous rivalry and emulation, by the memory of their former distinction, by respect for their officers, by loyalty to their country, and by love for their Queen.

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CHAPTER VIII.

HORSE ARTILLERY AND CAVALRY.

That cavalry and horse artillery will play a prominent part when acting independently, or in the immediate front of armies, is now everywhere recognized. The action of these two arms on the battle-field is, however, less well understood, and their value when once battle is joined is occasionally questioned. I myself believe that they may do much to supplement or support the action of a combined force engaged with the enemy, and therefore propose to devote this chapter largely to that portion of their duties.

It is in this latter *rôle* that we most often see guns and cavalry utilized at our field-days and manœuvres, and on active service we may also anticipate a great extension of the demands which will in this way be made upon them. But in order to thoroughly appreciate the value of horse artillery, it is necessary in the first place to have a clear conception of its nature and its origin, and therefore, perhaps, before I say any more, I will ask my readers to cast a glance backwards to the earlier stages of its existence.

Originally adopted in 1759 by Frederick the

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Great for employment with his cavalry, the advantages with which mobility endowed field artillery soon caused the arm to be introduced in a far larger degree than its use with horsemen only demanded. Austria followed the lead of Prussia in 1779, France in 1791, when General Matthieu Dumas formed two companies, increased to nine in 1792, and thirty in 1793; Russia and England in 1793, the latter with four troops, which had been increased to fourteen at the date of Waterloo. Galloper guns belonging to the Madras Artillery had been employed in the second Mysore war of 1790-1792, and again in the third Mysore war of 1799. In the year 1800 "an experimental brigade" of two guns was formed in Bengal, and what was termed a battery of horse artillery took part in the operations in Egypt with the Indian Contingent (under Sir David Baird). From this time the value of the arm was much appreciated in India, and the number of batteries grew until in 1816 there were six troops permanently organized. Up to this time there were no field batteries, as we understand them, at all. "Guns lived in magazines," were taken out as occasion required, and were manœuvred either by men on foot with drag ropes, or by bullocks. How vast was the difference in those early days between such batteries and the others of the horse artillery which possessed as much mobility as perhaps do any of to-day, is at once apparent, and accounts for the great preference shown for horse artillery

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by the generals who conducted our numerous campaigns in India in the early part of the century.

In Europe, during the wars of the French Republic, field batteries were but little more mobile than those in India, and we find Napoleon using horse artillery to a very large extent, therefore, while in the Prussian service also its proportion to field artillery was very high. The reputation of the horse artillery in the French army at the period of its first introduction was of the brightest. General Foy, "Histoire de la Guerre de la Péninsule," Paris, 1827, says: "The horse artillery at its creation was composed of the most active artillerymen, and was afterwards recruited from the best grenadiers. It performed marvels; in the campaigns in Germany simple captains in this arm acquired a reputation throughout the whole army. Generals soon wished to have no other artillery, because this being lighter and more efficacious, less of it was required, and the length of the columns on this was proportionately shortened."

As technical improvements in the manufacture of *matériel* were brought about, and the weight behind the teams in field batteries was lessened, the difference between the two types grew smaller and smaller, until in 1870 it became a question whether there was any need to organize a special horse artillery at all. Any such ideas were, however, dispelled by the experiences of the campaign in France of that year, and a demand arose at its close for more rather than fewer such batteries.

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In 1874 the Austrians, who had discarded it, carried out a series of experiments at Totis, and in consequence of what they learnt, reintroduced the arm, while at the present moment, when we want to develop fire effect, and yet not increase the burthens of the horses, the mounting of gun detachments, or of part of them, is simply a question of expense. Everybody would wish to do so, but considerations as regards the budget prevent its being done; because the value, or rather necessity, which mobility is to field artillery is the lesson which all practical work, whether it be on active service, or at Aldershot, or at Okehampton, seems to point out.

For short distances or on level ground, guns, with four or five men seated upon them and their limbers, appear to get along capitally; so they do, but weight tells surely when anything of a strain is felt. But it is also of great benefit to have men as gunners who are of powerful physique, such as are those who wear the jacket in our service. The gunners in field batteries are in these days not of adequate stature, and I have shown that those who speak of running guns into position by hand do not realize how arduous such an operation under existing conditions would be. It is not the least advantage which our horse artillery possesses that it can rely on stronger men to man its guns than can our batteries of field artillery, and under the strain of active service this would soon be discovered.

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It is for these reasons that a practical soldier like the late Prince Kraft recorded his opinion that all the *corps* artillery should be composed of horse artillery batteries; and it is for the same reason that cavalry divisions abroad, and in this country, too, now demand to have batteries as an inseparable part of their unit. Otherwise, the experience of 1870 has told them that this adjunct will be continually in use away from them.

I happened two years ago to receive a most excellent demonstration of the difference the equipment of a horse and field battery makes, and it comes in so appropriately here, that I will stop for a moment to quote a letter which gave me an account of it. The writer of it (he belonged to the Honourable Artillery Company) said: "You may perhaps know that we have a battery of horse as well as a battery of field artillery, and that they are drilled together as a brigade division. We went out last Friday week to the Long Valley for drill, and drilled at a steady trot, forming line from column, column from line, and wheeling into battery columns, and into line, &c., &c. I had not been paying much attention to the horses themselves, when certainly within an hour of our arrival in the Valley, the veterinary officer of the field battery came up and said that the division must be halted for a bit, as the horses of the field battery were blowing. The batteries were at once halted, and there is no doubt that the field battery horses were considerably distressed, whereas those

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of the horse artillery were as fresh as paint. All conditions were similar, i.e. equipment (9-pr. R.M.L., without any ammunition); same stamp of horse (all from T—, the same class he sends to the Fire Brigade); horses in similar condition; same skill in the drivers; the only thing different being the five gunners on the gun and limber in the field artillery, the horse artillery, of course, having none. In the service one is always in a brigade division, either all horse artillery or all field; therefore a direct comparison during similar movements would very rarely occur. There had been a little rain, and the Long Valley was heavy going, no doubt; but still I noticed on the road to Aldershot that the field battery did not seem to travel so well, though we did not march very fast; twelve miles in two hours being by far the fastest bit. My own idea had always been that of course horse artillery could keep going much longer than field artillery, but I had never imagined that the field artillery would have shown signals of distress as soon as it did. I have mentioned this to one or two officers of the regiment, who have also expressed surprise."

I think that the last paragraph just quoted justifies my again accentuating a point on which men who have had much experience have no doubt whatever.

I could quote similar examples from the records of active service, both of our own armies and of foreign ones, but I do not think I need further

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dwell on this particular point now, except, perhaps, to say that we do not very often want rushes over short spaces at a gallop from horse artillery; on an emergency we may need them, and probably will, but it is practice in getting over extremely long distances at a steady unbroken pace that is so valuable, the power to make quick forced marches which, Prince Kraft says, the Prussians learnt the necessity for, and practised after the campaign of 1866. He tells us too from his personal experience that, "in order to come into action in time when moving from Rettendorf by Königinhof and Chotieborek, to a point south of Jericek, I had to trot fourteen (English) miles in a hilly country; and even this, as far as one can see, will not always be enough in the future." Again, he says (6th Letter) that "forced marches were the rule in 1870," and quotes the experiences of the 1st horse artillery battery of the Guard, which marched on the 13th of August from Bermering by Oron to Dieulouard, a distance of thirty-two English miles. At Vionville the horse artillery brigade of the 3rd corps marched seven miles in three-quarters of an hour over hilly and narrow stony roads. The field batteries took just double the time to do the same distance. At Beaune-la-Rolande again, it marched thirty-one miles on to the field of battle.

But even on what may be termed the battle-field itself greater demands than formerly will be made on horse artillery. Distances will be greater than they used to be, and, moreover, there will in all

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probability be a marked difference in the manner in which a final effort to drive an attack home will be made. Formerly the reserve artillery possessed the heaviest metal, and it came up late in the fight, and was often concentrated against the point of assault, which was assailed directly from the front. A modern battle will partake more of the nature of an envelopment on a wide front, and unless accompanied by a flank attack, it will, in the face of the retaining power of modern fire-arms, scarcely be possible to turn an enemy out of his position by a direct assault. It appears to me that any batteries which have been held in reserve will be sent on wide turning movements, and that the duty of carrying these out will fall naturally to the most mobile portion of an army.

There are, therefore, three *rôles* in which, for the future, horse artillery may be employed:—

1. As an adjunct to the cavalry brigade or division in reconnaissance work, in pursuits, in retreats, or in an independent cavalry combat, fighting at decisive ranges.

2. As field artillery of a special mobility for use as corps artillery.

3. And, finally, when on occasions it may become the most important part of the cavalry brigade, or division, when this is sent to make wide turning movements during the progress of a battle.

As regards the duties of guns during a purely cavalry combat, I have myself said much in a little

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book called "Guns and Cavalry" on that part of the subject; for that reason, and also because it is best, perhaps, not to dogmatize as to the tactics to be adopted therein, I will only briefly touch upon it now. It is the spirit rather than the letter of anything like rules which should guide men in actions where guns and horsemen act together as an independent force. We must try and work on a system, and the cavalry leader must have a clear scheme of action in his mind; but the best laid plot may suddenly have to be modified, and the broad principle is that the guns must aid the cavalry when and where they can. The *how* must sometimes be left to the circumstances of the moment, and after the first movements the gunner must often act on his own judgment, and not expect to receive further instructions. One great thing to remember is that the enemy's squadrons are what we want to destroy; if we do that we can have his guns too, for they will hardly get away before our victorious pursuit. I know that I am here at variance with Prince Kraft, and his authority is to be respected. He says that the enemy's guns are first to be destroyed, and that when they have been accounted for it is time enough to turn attention to the cavalry. Such views are, however, in my opinion largely influenced by those which govern the action of artillery in an ordinary engagement, and are dictated by a mistaken valuation of the powers of guns in a short and fleeting combat. There would

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rarely or never be time, when the decisive crisis of the fight came, to engage more than one target, and then, at that supreme moment, even if you have perhaps half your guns temporarily out of action, through losses amongst the teams because you have made a bold advance, still, if the remainder can get in a few shrapnel at a very decisive range at the enemy's squadrons, I am convinced the effect upon the latter will be so great that even considerable sacrifice, should it be involved, will be justified.

Lord Roberts, who has had great experience with large masses of cavalry and horse artillery in India, has put the matter most excellently when he said, as he did during the discussion succeeding a lecture I once gave on this subject, that often there is no time for consultation between cavalry and artillery leaders. The former must trust to the latter absolutely, and he will have enough to do to outmanœuvre the enemy's squadrons without trying to handle the guns too. Both leaders in a cavalry action require to be possessed of great quickness, decision, and tactical instinct. Whether the artillery will have opportunity to deliver a telling fire depends entirely on the rapidity with which its leader makes up his mind what to do, and the position he chooses for his guns. It is very seldom that a change of position is practicable after the guns have once unlimbered and come into action. Rapidity of decision on the part of the commander, accuracy and rapidity of fire on the

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part of the *personnel*, and mobility as regards the guns,—these are the essentials towards horse artillery success in the opinion of Lord Roberts.

On the other hand, if we are to judge by what has before now often been seen at manœuvres, should the two artilleries engage one another at comparatively long ranges, and be drawn into an artillery duel, the cavalry will fight its battle out quite independently of the guns, and there will be little or no co-operation between the two arms. And another great general principle should be kept in mind by artillery officers in this nature of combat, and that is, that they must never, if they can help it, let their guns get into such a situation that the cavalry will have to make a sacrifice to extricate them. Few cavalry officers, in the heat and excitement of an action, and especially a rear-guard action, will send orders to the guns to move. They will have to conform to the progress of the fight, and the officer who leads them must not wait for orders after he has once unlimbered.

Nor do I need to remind my readers of what assistance guns may be to the cavalry working in advance of armies. I have in a previous chapter touched upon that point also, and a very few instances from the Franco-German War will in themselves be enough to convince even the most sceptical. The mere appearance of a horse artillery battery was enough on many an occasion to cause the hostile cavalry to withdraw. When Von Redern

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was reconnoitring with his brigade on the 15th August towards Xonville, he came across Prince Murat's brigade belonging to Forton's cavalry division, the flankers of which skirmished for a little, but when a German horse battery was brought up, the brigade retired, let the Germans come on, and note Forton's cavalry division halting near Mars-la-Tour. There were twelve guns with the French, too, which might have been turned to some account.

Again, at Buzancy, the regiments of Brahaut's cavalry division refused to face the Saxon squadrons who were looking for the French army, because they had no guns to oppose the battery which was brought into action against them, and the consequence of that error on the part of the French led up directly to the surprise and defeat of Beaumont.

It is indeed in reconnaissance work ahead of the main army that horse artillery will, I believe, be quite indispensable. Nothing more effectually searches cover than a few shells, and they can force many an obstruction that might be held for a long time against cavalry alone.

I will not, however, now dwell long here; nor as regards the employment of horse artillery under the artillery commander as corps artillery pure and simple, is there, either, any necessity for me to enlarge. The guns are then turned to account when and where they may be most needed; and they are valuable because their mobility may

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at critical moments enable them to accomplish feats in getting into position rapidly, beyond the powers of field batteries, or to do so over ground which might unduly tax the resources of less active units.

But on the third *rôle* there is much to be said which I think will be interesting, because the necessities of the day seem to here offer to cavalry and guns once more a sphere of usefulness in which they have before been largely turned to good account, and the great range and effect of modern shrapnel have confronted generals with difficulties which were not formerly experienced when forming a plan of attack.

If we consider what the course of a modern battle is likely to be, we can scarcely fail to be struck with the increased resisting power with which improvements in fire-arms have endowed the defence. Even in 1870 the character of a battle had grown to be of the nature of a long-drawn-out effort on the part of the attack to weary out and bear down by sheer weight of numbers and persistence the stubbornness of the defence. Fire-arms, and especially those of the artillery, have improved vastly during the last twenty-five years, and to force the enemy's line by a frontal attack seems, as I have said, on paper at any rate, an extremely arduous enterprise. Positions will, however, have to be carried, and will no doubt be carried, just as they have been before, even in spite of the most appalling losses; but every effort

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should be made to reduce the sacrifices involved to a minimum, and to let skill in manœuvring replace or supplement brute force.

Flank attacks have ever been employed when possible by every skilful leader, and in these days they will have to be resorted to when the ground is at all favourable. But, as I have shown in the last chapter, the space occupied by troops nowadays is so great that to move round an enemy's flank is no longer so feasible a manœuvre as it was. In doing so, it is to be remembered that you also lend your flank to assault, and that unless the turning movement be carried out beyond striking distance of the foe, he may spring upon you in the act, just as Frederick did on the allies at Rossbach, or Wellington did on Thomière's division at Salamanca, or as Napoleon smote the Russians at Austerlitz. You must be able to strike very swiftly and opportunely if success is to reward you; the swoop on the flank should come simultaneously, if possible, with one from the front, and to effect such an union of force you must either surprise your foe completely, or you must forestall him by rapidity of movement.

Now, to keep out of reach of modern shrapnel means that your columns must move on a very wide arc. Not only that, but should circumstances suddenly alter, and it become expedient to abandon the enterprise, you should be able to draw your hand out of the fire ere it is destroyed. In other words, any general who in the future

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attempts either a serious flank attack, or such a powerful demonstration as shall influence his opponent's scheme, must be able to utilize troops possessed at one and the same time of great fire effect and immense mobility. It seems, then, that horse artillery batteries, in conjunction with a powerful force of cavalry, supported, too, by mounted infantry, will supply him with the very tool he needs for his purpose.

And when such an employment of horse artillery is suggested I would remind my readers that it is only a revival of former tactics which is recommended. Napoleon habitually used cavalry and horse artillery in this very way. The campaign of 1814 will furnish several excellent illustrations.

At Rheims he turned the Russian left with 8000 horsemen supported by 30 horse artillery guns.

When Blucher, defeated at Vauchamps on the 14th, February, 1814, was falling back by Etoges on Châlons, Napoleon endeavoured to destroy him by a wide turning movement made with Grouchy's cuirassier division and its two horse artillery batteries. No one who reads the account can fail to see that the Prussians only escaped complete annihilation by the steadfastness of their infantry, and that they would have been unable to withstand the inundation of cavalry had guns been present to supplement the efforts of the horsemen; all the accounts admit this, and the Germans were frankly grateful for the good fortune which befriended them. The weather in the winter of

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1814 was, however, very bad; the fields, and even the roads, were deep in mud and snow, and almost impassable. The two horse artillery batteries that were intended to act with Grouchy got bogged, had to be left behind, and were unable to take their share in Napoleon's stroke. The Prussian infantry formed solid squares, which they could not have kept intact under the showers of case which the tactics of the time would have called forth upon them from the guns. Thus, though Grouchy brought nearly 100 squadrons to bear, Blucher managed to make good his retreat, and, although beaten, was able to re-form his troops for another effort. Who will say that such a great flank attack by masses of cavalry on a retreating foe may not be perfectly feasible in the future, and bring the vast results with it that it has done before in military history? The fire of guns will indeed be even more valuable than it used to be, for they can produce their effect from greater distances and over wider spaces than was formerly the case.

But an even better example may be culled from the annals of the year before, and the achievement of Murat at Dresden on the 27th August, 1813. Napoleon was then also at bay before a vast preponderance of foes, and all his ingenuity was required to equalize the scales. That was a time of rain and mud too, and guns could scarcely be too light if they were to move with cavalry. Therefore, the great Emperor double-horsed them with teams from the com-

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missariat wagons, and he sent Murat with 10,000 sabres and six batteries of horse artillery to envelop and destroy the Allied left. So well did that brilliant leader of horse perform his task that he killed and wounded 4000 men, and took 12,000 prisoners. I know the day was wet, and that the infantry could not use their muskets, but that was the fortune of war, and the performance was a great one all the same. The horse artillery batteries worked well with Murat's squadrons too, and we read how they followed up the beaten foe, and, coming into action from hill to hill, poured a destructive fire on their opponents, whose chiefs had not supported them, as they should have done, with guns.

There are lessons, I think, to be learnt from these old battles. The method by which the force was applied was different, ranges were short, and *mitraille* was used in place of shrapnel, but the principle which underlay the tactics is an universal one, and I do not believe that it is any extravagant notion to regard it as an influence which is still potent.

Indeed, I shall presently show you the Germans in 1870 armed with modern weapons, and facing opponents equipped with a rifle but little inferior to our own of to-day, utilizing their cavalry and horse artillery for just the same purpose as Napoleon used his at Dresden, as Soult used his at Albuhera, and as ours was turned to account on the defensive at the same battle.

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It is especially interesting for us Britons to study defensive tactics, because they have been the methods we have so often relied upon, owing to the circumstances under which we have fought on the Continent. Now, the soul of the defence resides in an opportune counter-attack, and it is on the flanks of the attack that such a blow may most effectively be dealt. It is because they were defensive battles fought against widely superior odds that I am particularly glad, therefore, to refer to two from the campaign of 1870, and because also we may gather some most instructive and striking examples as to the use of cavalry and horse artillery on the field of battle from them.

At Beaune-la-Rolande (28th November), according to the official account, 11,000 Germans with 70 guns were called upon to ward off the endeavour, inspired by Gambetta, of 60,000 Frenchmen and 138 guns to advance to the relief of Paris. Under the strain of such an unequal struggle we shall find artillery again and again called upon to make immense exertions, shall read of batteries asked to show great mobility, and we shall find guns, when horses and men were wounded, having to be abandoned because they were stuck fast in the soft ground. We may there see cases in which the superior mobility of horse artillery was of vast service, and we shall glean instances of the guns and cavalry striking more than one opportune blow.

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Early in the battle Beaune would have been captured by the French but that Major Körber led up the two horse artillery batteries of the 10th Corps from Marcilly in the nick of time to the east of Beaune, and, taking the French infantry in flank at 800 yards, brought its advance to a standstill. On the left flank the French had also to suspend their advance, as they were suddenly threatened there by the 1st Cavalry Division. The latter had been assembled at Boynes shortly after the commencement of the action, and at twelve o'clock, in accordance with a summons from General Voigts-Rhetz, had advanced to the Butte de l'Ormeteau. The horse artillery battery, escorted by two squadrons of the 4th Lancers, which hastened forward in that direction, had, shortly after one o'clock, opened fire upon the enemy's columns which appeared between Batilly and Arconville, and afterwards from a position further south, upon the masses of troops marching along the Cæsar road. We need not pursue our story of the day further now, but no one who follows it out carefully in the official account will fail to note what a day of storm and stress it was, and how well all the special characteristics of infantry, cavalry, and artillery were turned to account.

Beaune-la-Rolande and the other battle I am going to speak of are not so celebrated in this country as some, such as Vionvillle, and Gravelotte, and Wörth, which are in everybody's

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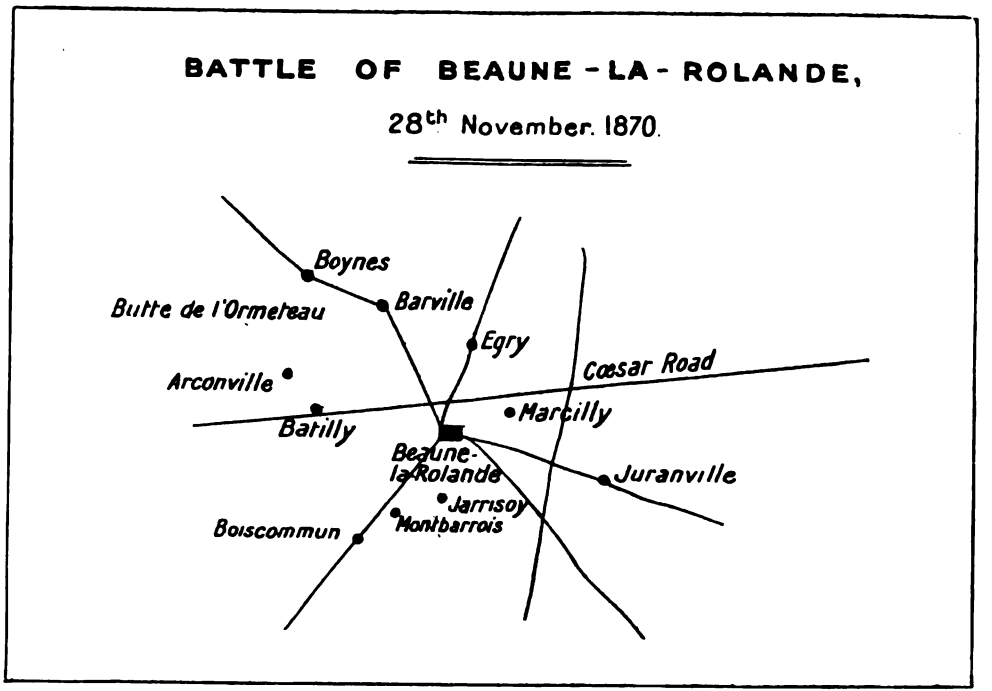

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mouth and figure in every examination paper, but they are regarded by the Germans as struggles which may rank with even the great triumphs I have named, and they will repay study and attention on the part of officers. Loigny-Poupry is indeed quite one of the most dramatic and interesting battles of history, and valuable deductions in almost every sphere of tactics can be drawn from it. Just now, however, we will look into it more with a view to horse artillery and cavalry action than anything, and my notice must be but a brief one.

On the 2nd December, General von der Tann, with the 1st Bavarian Corps, was at La Maladerie, facing south-west. On the previous day he had been assailed by the French in their effort to reach and relieve Paris at about three o'clock in the afternoon, his 1st, 2nd, and 4th Brigades had been heavily engaged, and had lost in the short fight of rather less than two hours which had ensued, 37 officers and 698 men killed and wounded, and 5 officers and 196 men missing. They had been unable to stem the onslaught in greatly superior numbers of their opponents, but had fought with great bravery and determination an uphill fight, which, however, is, as Villepion, to be recorded as an undoubted French success. The night of the 1st was intensely cold, and many of the German units suffered very severely from exposure, as they had been obliged to bivouac owing to the proximity of the enemy,

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while it did not add to their comfort that they had no cooked rations, in consequence of the wagons which carried them having gone astray. The French, too, were not only in superior numbers on the 2nd, but they were in unusually good heart, having just won the battles of Coulmiers and Villepion. This circumstance should be taken in consideration in estimating the German performances which I am about to describe, and goes some way, at any rate, to decrease the advantage which their trained soldiers had over the raw levies which opposed them.

I may add that the country in which operations were taking place was generally level, broken by gentle undulations, but furnishing little cover of any sort; the fields were highly cultivated, but were unfenced, and the sharp frost had rendered the soil hard and favourable to movement.

About eight o'clock the German outposts could see that the French 16th Corps was again pushing on in full force, and von der Tann received orders from the Grand Duke to take up a position between Beauvilliers and Château Goury, with his left resting on the latter place. He was informed that the 4th Cavalry Division would protect his right flank, while the 17th Infantry Division was moving on Lumeau and the 22nd on Baigneaux to his assistance. But when, in accordance with these instructions, he was in the act of taking ground to his left, he was assailed

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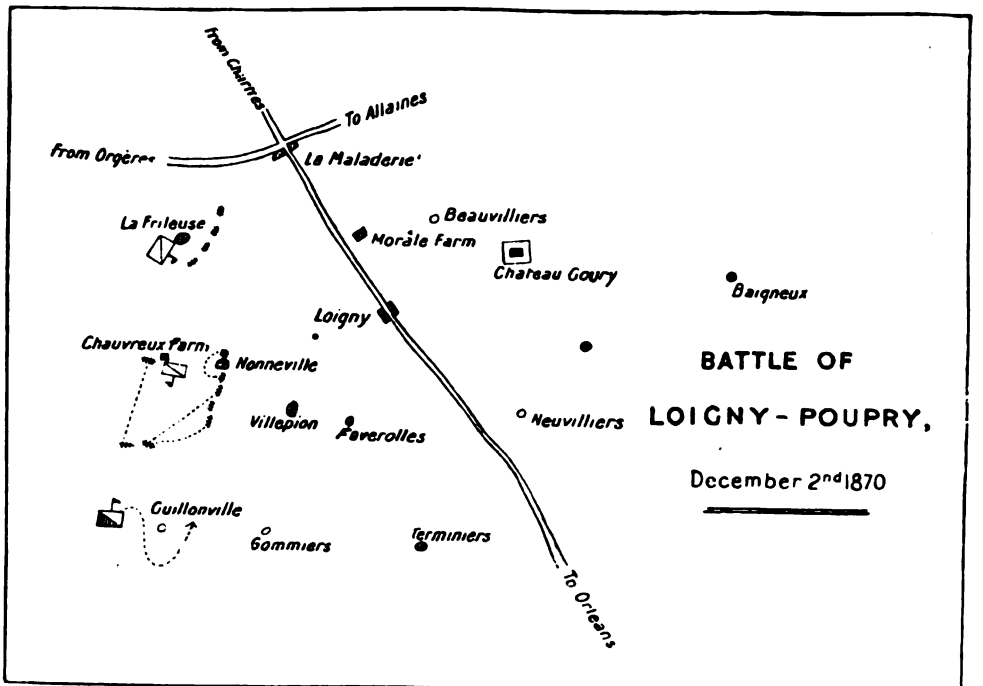

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before his movement was completed, and his 2nd Division had to be deployed, and was in action at about 9.30 o'clock between Beauvilliers farm and Château Goury.

With reference to this particular part of the contest, it is enough to say now that the fight surged to and fro for some time with varying success. The French at first pressed on very triumphantly, but a brilliant counter-attack by the 3rd Bavarian Brigade brought their advance to a standstill, and eventually forced them back in some disorder as far as Loigny. The whole French 16th Corps was now, however, deployed on the line Neuvilliers-Nonneville, and as it came on the Bavarian Brigade was forced to fall back with very heavy loss. The fight is chiefly remarkable for the part played in it by the German artillery; six batteries, in the first phases of it, formed a solid framework, for the 2nd Division to deploy on, and enabled it to rally against the powerful French assault. Later the batteries again stemmed the rush of the second French advance, and faced the hostile skirmishers while their comrades rallied behind the guns. Eventually the guns, too, had to fall back to a second position, but being reinforced there by two batteries from the reserve artillery, were enabled once more to make a stand and cover the infantry while it was re-formed.

The position of affairs was, however, a critical one for the Germans, and the French right was

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making a vigorous attack on the west side of Château Goury, while their centre seemed about to pierce the German position between it and Beauvilliers; but General von Tresckow, who commanded the 17th Division, now received word of the state of affairs at Château Goury, and he acted with a true instinct.

He ordered Colonel von Kahlden, of the 17th Dragoons, to take his regiment and two horse artillery batteries[1] and to trot on ahead in order to lend what assistance he might to the Bavarians. Colonel von Kahlden sent one squadron to Lumeau, and with the other three and the two batteries, at 10.30 o'clock, reached a point south of Château Goury, from which he was enabled to open fire unexpectedly on the right flank of the French division (Barry). This artillery attack had the very best results. The Bavarians were extremely hard pressed at the moment when the batteries were unlimbered, and the surprise and confusion created by the sudden storm of shells which they poured upon the French enabled the 3rd Brigade to extricate itself and fall back.[2] Two squadrons were now sent away from the batteries to endeavour to establish communication with the 22nd Division on the east of Lumeau, and one remained with them as escort. The French attacks on both flanks came to a standstill soon afterwards.

[1] These batteries had only, however, 10 guns between them.

[2] These two batteries fired 476 and 720 shells respectively during the battle.

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I think the timely appearance of these squadrons and batteries furnishes us with a most interesting example, and well displays the value of a bold flank attack by cavalry and horse artillery. I must, however, now leave this portion of the battle-field in order to speak of events which will have an even greater interest for us. Before quitting it, however, perhaps I may be allowed to mention an extraordinary proof of the efficacy of artillery fire, and an event, perhaps, unique in the annals of war which occurred when the eighth heavy battery of the 3rd Artillery regiment was assailed from both sides of Morâle farm by hostile infantry, and was able to repulse the attack solely by its own fire. When the battery subsequently moved forward it came on a vast heap of corpses, the evidence of its fire effect. Beneath one of them was found the colour of the 41st French regiment, which the battery took possession of, and the trophy hangs to-day in the Royal Bavarian Army Museum at Munich as a memorial of its achievement.

But to return to something more relevant to what I am discussing in this chapter.

The 4th Cavalry Division had been occupied since dawn in reconnoitring on the French left flank, and the Brigade Krosigk had been successfully engaged with the enemy, but had eventually fallen back before superior numbers.

The two horse artillery batteries belonging to the division had come into action at 10.30 against

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French guns at Morâle farm. These they speedily caused to retire, and then advanced at a gallop to within 700 yards of French infantry, which they engaged. At 11.30 Prince Albert, who commanded the 4th Cavalry Division, received an order to take the Bavarian Cuirassier Brigade with his division, and to make a turning movement against the French left.

The two horse artillery batteries were now brought into action south of La Maladerie under the escort of one squadron, in a position where they were enabled to strike the flank of the French advance between Morâle farm and Loigny. They were soon joined by two horse artillery batteries belonging to the Bavarian Cuirassier Brigade, who came into action to the west of La Maladerie, and from that position their fire, which was directed upon the swarms of French skirmishers along the road from La Maladerie to Loigny, and at Morâle farm (1000 and 2000 metres distant respectively) was most effective, and assisted the Bavarian infantry very materially.

Meanwhile the 4th Cavalry Division had united itself together at La Frileuse, and remained there till about 2 o'clock.

About this time Prince Albert determined on a very bold and wide turning movement, directed against the left flank and rear of the French, and moved the division at a trot towards Nonneville. When he reached the south of Nonneville he discovered the columns of march of the 17th

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French Corps moving from the south on Terminiers to support the 16th. Prince Albert wheeled two Brigades to face these columns, while the 3rd Brigade (Krosigk's) preserved the former direction and moved on Guillonville. But the French batteries of the 17th Corps now came into action and fired on the division, and its advanced parties were fired upon also by French infantry near Gommiers.

To attack infantry which had not been at all engaged as yet would have been a useless expenditure of life, and Prince Albert, recognizing that the moment was not opportune for attack, drew his division back to Chauvreux farm. Meanwhile one of his horse artillery batteries[1] came into action on the north-west of Nonneville, and engaged a French battery which had moved into position close to a windmill to the north of Villepion. Two Bavarian horse artillery batteries also hurried up across country at a rapid trot from where they had been in action near La Maladerie, came into action on the other side of Nonneville, and supported it. Their combined fire soon drove off the French guns, and then the battery on the north of Nonneville joined the two on the south, and the three turned their fire on to some French batteries near Faverolles. These they drove away, and then began to shell the village of Faverolles and the French infantry posted near it. A squadron of Uhlans was left with these three batteries as an

[1] The 1st horse artillery battery of the 5th Artillery regiment.

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escort. The other horse artillery battery[1] belonging to the 4th Cavalry Division had meanwhile accompanied Prince Albert to Chauvreux farm, and remained there with the division.

Towards three o'clock several French cavalry regiments showed themselves on the west of Guillonville. The horse artillery battery from Chauvreux farm at once galloped out to meet the new danger, and came into action "at a decisive range" against them. Its fellow battery, having observed the French advance, also moved rapidly to its support, and engaged the hostile squadrons at a range of 1200 metres. These quickly had enough of the contest, however, and beat a retreat.

Just now, too, another attempt was made by the French cavalry to advance from the other side of Guillonville, but they were received by such a storm of shells from the two batteries that they fled precipitately—*davonjagten* is the German word. Indeed, we read that so headlong was their flight that the ten German cuirassier squadrons which had moved up to charge them could never catch them up. Finally, the French squadrons rallied behind their infantry at Gommiers, and the German pursuing horsemen had to let their prey escape.

The Uhlan Brigade of the division had meanwhile struck upon some French infantry, which had been thrown into great confusion by the

[1] 2nd of the 11th Artillery regiment.

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artillery fire, and captured 200 prisoners. Several other encounters between smaller bodies of the brigade also took place, but in every instance the French cavalry refused to face their opponents, and it was only the infantry fire from buildings and villages which held the German inroad back.

One word more may be added as to the horse artillery.

The two batteries, which had so gallantly driven off the French cavalry soon afterwards went further forward, and engaged some French batteries which had come up on the south of Faverolles. They were joined by one of the two Bavarian horse artillery batteries, and the other was left alone in its original position.

We have now to record a German failure, and we have a lesson as to the error of breaking up a brigade division. A French battery was facing this one, but as it seemed to be at too great a range it was not considered dangerous. When the Bavarian horse battery was left alone, however, the despised French battery, as though to vindicate the power of artillery, opened so rapid and accurate a fire that, in spite of the great range, it completely surprised its opponent and compelled it to limber up and retire.

Now, I think that among these incidents, thus briefly related we have very striking examples of what horse artillery and cavalry may accomplish during the course of a great battle. Prince

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Albert showed the greatest judgment and skill in the way in which he threw the weight of his command into the scale, and the onslaught he made on the French flank and rear had the most pronounced effect.

The German horse artillery batteries[1] have also received the highest praise for their conduct on this day, and their intervention materially affected the course of the battle. For, under the menace of their shells, the tide of the French advance was brought to a standstill, while the immediate evidence of their prowess lies in the fact that the 3rd Division of the French 17th Corps was deployed to meet their flank attack, and was left behind to guard the left flank while the loudest cries were going up towards Loigny for its aid. We are concerned only now with horse artillery and cavalry, or I could say much more of this most interesting and instructive of fights, but I hope I have said enough to show how potent and valuable a factor in a modern battle the mobility of cavalry and horse artillery may prove to be.

In this battle 28,000 German rifles, 6200 sabres, and 196 guns opposed 87,300 French rifles, 5600 sabres, and 264 guns, and captured 2500 unwounded prisoners, 8 guns, a mitrailleuse, and a colour.

On the German side, the proportion of guns to

[1] The horse artillery batteries belonging to the 4th cavalry division fired 900 shells between them during the battle.

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other troops was 5·72 per 1000 men; while the defeated had only 2·84 guns to the same number.

Examples to illustrate almost every feature of warfare can be culled from this battle, but this is not the place to deal with all of them. One, however, officers of cavalry will like to hear of, and I will pause for a brief notice of it.

When the French infantry was being driven back, at about half-past twelve, by the advance of the German 22nd Division, a 12-pr. battery of the reserve artillery of the 16th Corps tried to come into action near Neuvilliers to cover its retreat. Captain von Marschalk, who had ridden on 500 paces in front of his squadron (the 2nd of the 11th Uhlans), observed the movement of the battery, but thought at first it was a column of wagons. He, however, signalled to his squadron to come to him, and placed it in concealment. When the French carriages came nearer, and it was seen that they were certainly guns, the squadron rushed out suddenly upon their flank just as they were coming into action. So quickly and skilfully was the surprise effected, that not one single round was fired by the battery, and the whole of it was captured. That is to say one officer, 76 men, 77 horses, 6 guns, and 8 wagons fell into the hands of the Germans without a shot being expended in self-defence. It is an achievement fit to rank with Tobitschau, and should, like that brilliant example, encourage cavalry officers to endeavour, by means of turning cover and the lie of the ground

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to account, to surprise artillery, and accomplish great results, with little or perhaps no loss.

Interesting phases of horse artillery and cavalry tactics are suggested by such an incident, but I will pass on to make a few deductions from the examples which I have quoted.

I hope I have made good my contention, and that I have shown how the teaching of military history will bear me out, when I suggest that our cavalry and horse artillery should, on the battle-fields of the future, devote their attention to the enemy's flanks, to make powerful demonstrations, or even auxiliary attacks, when we are the assailants, and to be in readiness to fall on the hostile line of retreat, should we win our way forward. When, on the other hand, we await the enemy's assault, the same arms should secure us from similar enterprises on his part, threaten the flanks of his advance, or even deal a swift and opportune stroke, such as may pave the way to an important counter-attack.

It may be asked whether a cavalry division with two or three horse artillery batteries would be a sufficiently powerful force to produce much impression on the enemy in the manner suggested. My answer here is that what has happened before will happen again, and that as the modern horse artillery gun is so powerful that it can produce a very pronounced effect at 2500 yards at any rate, the chances in future will be more in favour of that arm than they were in the past.

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For, at such a distance as I have indicated, it will not be easy for an enemy to estimate the exact strength of the turning force, and, as I would suggest that the cavalry fight when necessary on foot, it will not be easy for him either to correctly analyze the exact composition of the force. I believe the effect of such a counter-attack as I have in mind would be very great indeed, and we must remember that a British cavalry division will have a battalion of mounted infantrymen with it also. These, it seems to me, would form a very valuable escort to both cavalry and guns, and would ensure their safety from any efforts against them made by hostile riflemen. I believe, in fact, that there are great possibilities and opportunities here for mounted infantry, and that through their aid a very mobile force, composed of the three arms, may in the future accomplish a very great deal by working together in the manner I have foreshadowed.

An interesting question may be raised as to whether it is not desirable, therefore, that horse artillery should form an inseparable portion of the cavalry division, and should not be taken away and absorbed in the general fight during a pitched battle. I believe both cavalry and horse artillery officers would welcome such an arrangement; and in Germany, and also in France, it is now decided that it shall be so. But in those countries they have a very powerful artillery, and can perhaps afford to leave some

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batteries idle for a time. In England, on the other hand, we have been and still are very weak in artillery, although in the army estimates for last year provision has at length been made to place us more on an equality with other nations. Until the disparity disappears I cannot help thinking that the batteries will be called from the cavalry division and placed in line to counterbalance the foreign preponderance. As a mere question of tactics it is undoubtedly best to leave the guns to the cavalry entirely, but circumstances, as I have said, may be too strong for a British general, and he may have to call up guns from wherever he can get them. And, therefore, until we actually see the new batteries, I doubt whether a state of things which we would all desire can be brought about.

In less than three years, however, we are to have a full complement of guns, and then I trust that we may see horse artillery allowed to work with the cavalry division in the manner I have suggested, and it will accomplish perhaps more in that way than if placed alongside the remaining batteries of the army corps.

And this brings me to another point. I have said before, and say again, that when guns and cavalry are working together independently, the cavalry is the principal arm, and the batteries are a mere auxiliary to it. That is quite the truth, I believe; but in this particular *rôle* which I have been discussing, it will be noticed that I

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have somewhat reversed the relative importance of the two arms, and have suggested that in these enveloping movements the principal effect is to be sought from the fire of artillery, while the chief duty of the cavalry will be to guard its safety. The enemy's squadrons may offer a tempting objective very possibly, but his infantry at the stage of the battle which I have in mind will be still unshaken, and it will be better to bring them to a standstill by means of a shrapnel fire than to sacrifice a valuable arm, unless there be some crying necessity for doing so.

I wish, however, to guard myself carefully against being misunderstood. I do not suggest that squadrons are to refrain from utilizing their powers in their true *rôle*, that of shock, should an opening come to them. If they succeed in gaining the exposed flank of an infantry attack and surprising it, a charge well executed by a cavalry division might have the most far-reaching consequences; but we cannot count on surprises, and should none be feasible, then we must fall back on the effect of fire, and bring the foe to a standstill by shells and bullets. To enable guns to settle down to a deliberate cannonade it will be necessary to secure their flanks and rear, and the duty of safe-guarding them will become a paramount one, and must be left to their brethren of the cavalry and mounted infantry. But there is surely as honourable a field here for co-operation between the two arms as there is in the more exciting and rapidly moving

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incidents of a purely cavalry action? On one occasion the guns should play into the hands of the squadrons; in the other, the anxiety of the squadrons should be for the guns. In the one case we seek to produce our effect chiefly by shock, in the other chiefly by fire. But in each and every case we work together to help one another, and with but one end in view—the most complete and rapid destruction of our opponent. And that the way to such success is paved by a genial co-operation is the lesson I would wish to inculcate. It is only by the most sympathetic union that we can hope to fully accomplish even a small part of the duties that fall to cavalry and guns; but, given a clear, mutual understanding between them, there lies an almost immeasurable field of usefulness before these arms.

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CHAPTER IX.

AMMUNITION SUPPLY.

THE matter of ammunition supply has, I fear, a somewhat forbidding aspect. There is little of the picturesque or romantic about it, and on active service the "train" must ever occupy a very secondary position to the fighting line in the minds of officers. Not only that, but the exact organization and equipment of an ammunition column is a problem of no mean order in our service. The data supplied by the official tables are more or less inaccurate, because since their publication the armament of batteries has been altered, the packing arrangements vary from time to time, and the quantity of ammunition carried alters with both. What was correct for the 12-pr. of 7 cwt. is no longer so for the 15-pr., which has succeeded it at home, and in a few years the 15-pr. may have fallen back into the limbo where our muzzle-loaders find a resting-place. Nevertheless, every officer should have some general idea of the principles which govern ammunition supply. Fire in the future will in war be more than ever everything,

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and somehow or other the voracious maw of the devouring monster must be fed.

Ammunition supply is indeed a subject for consideration which especially calls for study just now. Men have of late years been so absorbed in learning how to hit and move, that the equally important duty of how to supply has had perhaps less attention paid to it than it deserves. A battery in action, it should be remembered, is in the position of a struggling tradesman living on his capital. The greater efforts he makes to cope with the competition round him, the shorter time can he hold out. If success, even though it be already in sight, come not quickly, he may collapse from inanition, and if he have no reserve fund to dip into, triumphant though he may have been up to a certain point, he must in due course find himself in the position of a clock run down, a steamer without coal, or a lamp without oil. At "ordinary fire" with the 12-pr., as we shall presently see, one ammunition box will feed one gun for about half an hour, and each gun has six boxes to call upon behind it. In three hours, therefore—even under the normal conditions of the opening of a fight—the guns will have shot their last bolt.

Yet on the eventful 16th of August, 1870, some of the German batteries were in action the best part of twelve hours; one battery alone fired 1164 shells, and several others got rid of more than 1000 rounds. At Gravelotte, two days later, the

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consumption of ammunition was almost equally great, and the battery most heavily engaged expended very nearly 1000 projectiles. Now, in our service, each 12-pr. field battery carries with it but 600 shells.[1] It has, it is true, some case shot besides, but these, being useful only on particular and more or less exceptional occasions, may be left out of consideration. For ammunition beyond the amount just named, it must look to the divisional ammunition column, which forms its first reserve, and which is toiling along weary miles of road behind it. If communication, rapid and effective, be not established and kept up between reserve and fighting line, the guns, ere the battle is half developed, may have to play the part of targets in place of engines of destruction. It is as necessary to practise officers and men in their duties connected with the renewal of ammunition to the pieces they fight, as it is to instruct them in the art of shooting straight or of manœuvring.

If arrangements are judiciously made and there be no mishaps, the wagons, which constitute the reservoir—or enough of them to tide over the difficulty—should arrive ere the guns have exhausted the stock they have with them, and there should be no break in the continuity of fire. The ammunition column should then be able to provide enough rounds for any battle for which artillery, judging by past experience, may be engaged. For an average expenditure of 1000

[1] In the case of the 15-pr. there will be more than 800.

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rounds per battery, although in 1870 it may have been exceeded in a few exceptional and isolated cases, is a sufficient estimate for what we may be called upon to face.

Battles, however, occasionally last for two days, and have even been protracted over several.

Essling and Wagram, for example, both extended over two. The great struggle at Gettysburg was not decided until three had passed. And when the Grand Duke of Mecklenburg-Schwerin faced Chanzy during the Orleans campaign, he had to rely on his guns to hold his ground against superior numbers for four exhausting days. A general should indeed feel ready for another battle, even when he has just gained a victory, and a second reserve of ammunition for his guns, called an ammunition park, has therefore to be provided behind that which is comparatively near at hand, and which has filled his boxes during the fight he has just survived. It is usually held a day's march behind the batteries in rear of the battle-field, and from it the empty wagons will be replenished during the night, so that at dawn the following day the guns may be able either to continue fighting or to move forward in readiness to meet a new foe.

In the case of an army corps organized for home defence, the arrangements are a little different. In place of an ammunition park we have a "field depôt," which would be located on a line of rail usually about a long day's march behind the fight-

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ing. It would in England be always possible to place this depôt on a line of railway, and therefore the wagons, horses, and carriages which are required in the ammunition park are unnecessary, and can be in part dispensed with.

Having said so much by way of introduction, let us now consider exactly what materials we have to deal with in the field, how great are the responsibilities of an artillery officer in charge of ammunition columns or parks, and what reserves of ammunition a general may be able to count upon.

An army corps is divided into three divisions and a proportion of corps troops. There is also a cavalry division or brigade to be considered.

Each of these bodies is supplied by an ammunition column, and these columns in turn are filled up from a section, in the case of service abroad, of the ammunition park. As has already been noted, "Field Army Establishments" provide a "field depôt" to replace an ammunition park in the case of "home defence."

For convenience the ammunition column may be termed the first reserve, and the ammunition park the second reserve, of ammunition.

These reservoirs are placed behind what may be termed the fighting line, but within it there are minor reserves of ammunition also.

Thus, three wagons are placed behind the guns of each battery while they are in action (battery reserve), and three wagons and six limbers per battery are placed some 200-400 yards still further

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to the rear and may conveniently be referred to subsequently as the "wagon line." Corresponding to these magazines, as they may be termed, in the case of infantry we have the battalion reserve, analogous to the three wagons behind the guns or the limbers, when "limber supply" is going on, and the brigade reserve, which is represented in artillery by the wagon line of a brigade division.

A tabular statement will perhaps render my meaning clearer :—

1st Division.	2nd Division.	3rd Division.	Corps Troops	Cavalry Division.
2 Brigades 1 Squadron Cavalry 3 Batteries	2 Brigades 1 Squadron 3 Batteries	2 Brigades 1 Squadron 3 Batteries	1 Battalion 1 Squadron 2 Batteries, R.H.A. 6 Batteries, R.A.	2 Brigades Cavalry (6 Regts.) 2 Batteries, R.H.A. 1 Battalion Mounted Infantry

1st Reserve	Divisional Ammunition Column	Divisional Ammunition Column	Divisional Ammunition Column	Corps Troops Ammunition Column	Cavalry Divisional Ammunition Column

AMMUNITION PARK.

2nd Reserve	1st Section	2nd Section	3rd Section	4th Section	5th Section

The above table will place the organization of an army corps for service abroad, which we may accept as typical, before my readers.

It is not thought necessary to give all the

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details of the minor units, such as bearer companies, &c., which go to complete the divisions, since these can be gleaned from "Field Army Establishments," and the broad principles of ammunition supply may be dealt with without entering into the excessive minutiæ which would otherwise be involved. Nor will it either be desirable to investigate the composition of these ammunition columns with reference to *personnel*, horses, and carriages. Data as regards these can be found in "Field Army Establishments" for 1892, a book which, if not up to date, is the nearest to being so of any that have received official sanction. Since, as has been said, it is impossible to hope for finality in such tables, these will sufficiently answer our purpose in supplying us with a starting point.

It will, however, be convenient to briefly summarize the accumulation of data such tables present us with, and to place them in a somewhat more digestible form before our readers.

The method of supplying ammunition within the battery does not form part of our task for discussion in this chapter. It is presumed that artillery and a considerable number of other officers are familiar both with the system now in vogue, and also with the resources they may look for within such an unit. It may, however, not be amiss to recapitulate a few facts which should always be borne in mind.

Assuming the existing organizations and equipments as laid down in "Field Army Establish-

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ments" as a basis of discussion, an officer has with his battery 108 rounds.[1]

They are carried in six boxes, two on the gun limbers, two on wagon limbers, and two on the wagon body. As a rough rule, when the rate of fire is ordinary, it may be assumed that a box of ammunition will last half an hour.

The first line of wagons will therefore last one hour.
The second " " " " "
The gun limbers " " " " "

The battery could, therefore, in an emergency, fight for three hours[2] without having to call upon an ammunition column at all. But it is not intended that it should do this, and it would rarely, or never, if arrangements were judicious, have thus to stand alone.

Nevertheless, this supply for three hours' ordinary fire with the guns forms the special care of the battery commander, or in the case of three, of the brigade division leader. He is responsible for the expenditure of those 108 rounds per gun.

We shall presently see what an infantry officer of similar position is responsible for. Meanwhile I may add that, according to the tables I have given previously, the 18 guns of a brigade division can count on 1332 rounds (with 15-pr. 1454 rounds), that is to say, 248 common shell, 1008 shrapnel, and 76 case shot (with 15-pr. 1350 shrapnel and 64 case shot) with the column

[1] With the new 15-pr. equipment he has 150.

[2] With the 15-pr. equipment it will be able to fight for more than four hours.

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immediately behind it; or, in other words, on 74 rounds per gun (with 15-pr. 78 rounds per gun).

The corps troops ammunition column would under our former organization similarly supply its five[1] batteries with 2304 rounds, namely, 432 common shell, 1736 shrapnel, and 136 case shot. There being now 48 guns to be supplied, we may assume that there will be about 76 rounds per gun in this case.

With the 1st, 2nd, and 3rd sections of the ammunition park there are, according to the tables already given, 252 common shell, 972 shrapnel, and 72 case shot. This produces a grand total of 1296 rounds, which gives us a total per gun of 72 rounds.

With the 4th section of the ammunition park the tables give 420 common shell, 1620 shrapnel, and 120 case shot, in all 2160 rounds. There being now 48 guns with the corps artillery, we must have an increase to arrive at a total of 72 rounds per gun. To summarize, and adopting round numbers (we may leave case shot out of our calculation, as it is only for use on special occasions):—

The tables give with each divisional battery,	100 shell
1st Reserve	70 ,,
2nd Reserve...	70 ,,

and in round numbers the supply of shell with the corps artillery amounts to just the same proportion per gun as in the other cases.

The important question to decide now is, how long is such a supply likely to last?

[1] There are now eight batteries, in place of five, with the corps artillery.

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The rough rule is that with ordinary fire one box lasts half an hour, i.e. one limber or wagon lasts one hour.

Therefore, following the published tables—

The battery supply lasts	3	hours
„ 1st Reserve	„ 2	„
„ 2nd Reserve	„ 2	„
Total ...	7	hours.[1]

It being considered that the *average* total fired by each gun would probably never be as high as 240 rounds in any battle, this supply ought to be sufficient, and it is to be remembered that although ammunition columns are primarily intended for particular troops, they are never to refuse a supply to any one in need of it.

Having thus shown the position a brigade division commander stands in with regard to his own responsibilities, and to the assistance he has behind him, I will briefly indicate how an infantry leader of similar status is situated.

Of Lee-Metford rifle small-arm ammunition there are taken into the field for each infantry soldier—

100	rounds	carried by the soldier.
85	„	in four S.A.A. carts on two mules accompanying the battalion. } Battalion Reserve.
Total...185		
77	„	in the Divisional Ammunition Column.
60	„	„ Ammunition Park.
Total...322		

[1] With the 15-pr. equipment, eight hours.

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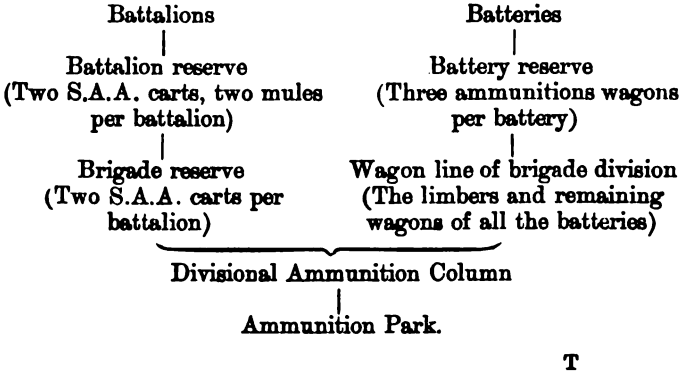
The officers commanding battalions are responsible for the 185 rounds per man in battalion charge. The artillery officers in charge of the columns and park are responsible for the remaining 137.

The position of the ammunition columns and park are determined by general officers commanding divisions and army corps respectively. It is the duty of commanding officers, however, to keep themselves informed as to the whereabouts of these columns.

Behind the battalion will usually follow two S.A.A. carts and two mules, and they will form a battalion reserve which corresponds to the wagons which are placed between guns in action. The remainder of S.A.A. carts, that is to say, two per battalion and the battalion baggage wagon, will follow the brigade generally, and will constitute a reservoir which corresponds with the "wagon line" of a brigade-division of artillery. This reservoir will be spoken of subsequently as the "brigade reserve."

We have therefore—



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The duties of an artillery officer who is in charge of an ammunition column cease when he has handed over the ammunition to the "brigade reserve" or the "wagon line." We need not here, therefore, enter into the question of its distribution after that point. It is, however, laid down that all battalion ammunition transport, when emptied, must at once proceed to the nearest divisional ammunition column to refill, and then return without delay to its position in rear of the troops engaged.

The following general rules and memoranda are suggested for the use and guidance of officers who may have to deal with the question of ammunition supply.

The ammunition columns follow their divisions at a distance which is decided by the general officer commanding; if there is more than one division on a single road it will have to be decided by him whether each column will follow its own division, or whether all are to move in rear of the whole force.

On the eve of, or during an action, ammunition columns must be pushed up to the front, and should endeavour to get within about a mile of the position which the guns may first take up.

Owing to the avenues of approach being very likely few in number, and movement off them in a close country impossible, or if they should become at all blocked or congested with traffic, or to facilitate retreat in the event of an obstinate

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stand not being intended, it will sometimes be desirable not to send the whole column on all the way, in which case a portion might be selected on the principle already indicated and be pushed on, while the remainder is held somewhat further to the rear.

It is to be remembered that an ammunition column for a division will require close upon half a mile of road when it is in column of route, and that in a close country such as England, a column of that length would often not find it easy to make its way to the front along a road which was being also made use of by other troops.

As the ammunition park is a whole day's march behind the division, it is enough to say, with reference to the space it will occupy, that, as a rough rule, twenty yards may be allowed for every vehicle—this including intervals.

If the ammunition columns be far to the rear, it may be necessary for them to move forward during the night.

Since a battery in action has with its guns usually three ammunition wagons, and the other three under cover, forming what may be termed the battery reserve (or where a brigade division is engaged the brigade division reserve, and which I have spoken of as "the wagon line"), it is a convenient arrangement that each battery should have a reservoir in the divisional ammunition column of three ammunition wagons, which three are to be regarded as interchangeable with the

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other sets of three which are in the front. As an addition one ammunition and store wagon packed with ammunition should be provided for each battery, and therefore the brigade division of three batteries can rely on nine ammunition wagons and three ammunition and store wagons with the column behind it.

I may now indicate more closely the special duties which will fall to an artillery officer who finds himself in command of one of these ammunition columns.

But before entering into detail it is desirable to lay it down as strongly as possible that the guiding principle of his conduct should be that the supply is to flow from *rear to front*, that full wagons or carts are to be sent forward to take the place of emptied ones, rather than that the reverse process is to be adopted.

It is probable that while still on the line of march the sound of firing or messengers will apprise him of the fact that the unit to which he belongs is deployed, or about to deploy for action. He must then at once send off some of the mounted orderlies which are at his disposal to find out whether ammunition is needed, and also to bring back word as to the position of the unit which he is to supply, and open up connection with it. A general direction only will often be given, and it will frequently be no easy task to lead the wagons expeditiously to the place where they are needed. Therefore, these orderlies, who

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are presumably intelligent men, and who, as they move, will study the lie of the ground as much as possible, having ascertained what they wanted to know, should without delay return to the ammunition columns, and be prepared to act as guides to those who may be ordered to lead forward the supply.

Until the officer commanding an ammunition column is quite certain of the exact position in action of the brigade division and infantry which he has to supply he should not leave the road. Because if he does so, it may not be easy for an orderly charged with a message to him to find him. But when he knows exactly where he has to go to, he should move by the shortest route, and across country, if the nature of it is such to allow of the free movement of wheeled carriages. Unless he has reconnoitred the path he intends to pursue he had better, however, usually be circumspect in leaving roads.

His column, when it takes up its position, should not do so on a road, and should assume such a formation as will facilitate the exchange of wagons and render repacking easy.[1]

Opportunity should also be taken to break down fences, fill up or bridge a path across ditches such as may be useful to the wagons when they again have to make their way to the road, and generally make any preparations which may be possible in

[1] A rendezvous formation, such as a line of columns of subdivisions or sections, would be a suitable one.

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anticipation either of a sudden forward movement or one to the rear.

Usually it may be supposed that there will be time for the ammunition column to form up before its wagons are called upon, but in any case the system of sending forward supply would be the same whether from the line of march or from a position.

While the ammunition column is forming up, the first care of the officer in command of it should be to establish communication with the wagon line of the artillery, or, in the case of infantry, with the brigade reserve. It might often be possible to do this by means of signalling, and such a method should be striven for in the first instance. But on the battle-field vision is often obscured, and messengers must in such cases replace flags.

Further, the officer in command of an ammunition column, whether belonging to an infantry or cavalry division, must bear in mind that he is responsible that the guns and rifles engaged are fed with shells and bullets. He is to accept that responsibility frankly, and is to arrange direct with the officers who are in charge of artillery wagons, or infantry brigade S.A.A. carts, and he is not to seek instructions or orders from officers of higher authority. The tactical situation will engross all the time and attention of these, and there is no need to trouble them with unnecessary details.

Should a demand for artillery ammunition come back from the front, three artillery ammunition

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wagons per battery (nine per brigade division) should be sent ahead to the spot where the wagon line is placed. It will be desirable, whenever possible, to send an officer with them, and wagons going and returning should be instructed to move when possible at a trot. On reaching their destination the procedure should be as follows:—

The horses belonging to the column should be unhooked and harnessed into the emptied wagons, and should take these to the rear under charge of the officer of an ammunition column, who will on his return set to work to repack them from the supply carried by the ammunition and store wagons.

There will be a number of arms and kits on all the wagons, and it will be necessary that these should be exchanged between the batteries and the column at the same time as the horses, otherwise much inconvenience and discomfort may be brought about.

The orderly who acted as messenger from the column had better remain with the officer who is in charge of the wagon line, as he knows best where to find the column, and his services may again be needed when another call on the reservoir has to be made.

The principle is precisely the same where a question of supplying small-arm ammunition is concerned. When the demand is received, the officer in command of the ammunition column should send forward one S.A.A. cart per battalion (or four

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per brigade) to the brigade ammunition reserve of each brigade which is in need. Again, the services of an officer to lead them should, whenever possible, be utilized.

The horses belonging to the column should be unhooked and put into the emptied carts as in the previous case, and these should, as before, be led back by the officer of the column and refilled from the ammunition and store wagon. It will not be necessary to exchange arms or kits in this instance, because the S.A.A. carts should be unencumbered by such things.

The guide or messenger from the column should remain with the brigade ammunition reserve during the action as in the case of the artillery.

Habits and ideas acquired in peace time are not readily shuffled off on active service, and difficulties might be made as to requisitions or vouchers, for which men are taught to entertain a pedantic veneration and respect in barracks. But no such things are necessary in the presence of the enemy, the ammunition column need ask for no formal requisition; a simple receipt for the number of full wagons or carts handed over will be prepared and accepted by the officer commanding it. These, when duly signed by the officer who receives the ammunition, will be all that is required.

It is not part of the duty of an officer commanding an ammunition column to keep an account of all the rounds which may be expended; that duty, should it be imposed upon him, falls to

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the share of him who leads the guns or rifles firing on the enemy, and his casualty returns can furnish the information.

The commander of an ammunition column should also practise his men in the duties which they will have to do in the field. They should thoroughly understand the nature of the various kinds of ammunition carried, and should be taught to pack and unpack it rapidly, and to shift it from one wagon to another. A regular system, akin to drill, with this end in view, should be established, and every opportunity taken to exercise the men at it.

On the other hand, it devolves on the senior captain in the case of a wagon line of a brigade division, or of the officer in charge of the brigade reserve in that of infantry, to endeavour to open up communication from his side by means of signallers with the ammunition column.

He should take the earliest opportunity to replace empty wagons or S.A.A. carts with full ones from the column, and the officer commanding the column ought to be kept informed of the number of empty wagons or S.A.A. carts there waiting till full ones can take their place. In the case of infantry it is, of course, the duty of the brigade staff to ensure that the empty battalion transport is duly replaced from the brigade reserve, but to save time, battalion transport should, in an emergency, be allowed, when empty, to proceed direct to the divisional ammunition columns to refill, and

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then return to its position in rear of the troops engaged.

All S.A.A. carts should be available for the brigade generally, and should not be looked upon as a peculiar property of any particular battalion.

Similarly the aid of ammunition columns or parks is not to be limited to batteries of their own unit. The utmost liberality of action should here be exercised, and ammunition, men, stores, or horses freely given or received during an action from any ammunition column which may be at hand.

As regards captains in charge of an artillery line of wagons of officers in a similar position with the brigade ammunition reserve, there are a few more matters to be noticed.

The position of the wagon line as regards the guns, or of the brigade ammunition reserve as regards the firing line in the case of infantry, is dealt with in the drill-books of those arms, and it is not necessary, therefore, here to discuss points with reference to distances or cover. It may be mentioned, however, that empty wagons should be kept with the wagon line and empty S.A.A. cart with the brigade reserve, until full ones to take their place have come up from the column.

It will tend to order and regularity, and will facilitate the labour of the men if, when full wagons are approaching a "wagon line," N.-C.O.'s are sent to meet and lead them directly along-

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side the exhausted wagons which are to be taken away. Confusion and delay will thus be obviated, and the exchange of horses, men's kits, and arms will be rendered more easy.

It will also be advisable, except in a case of great emergency, to keep the men and horses of a column from becoming mixed up with those of either the brigade division or the infantry brigades. Men and horses from the column should, therefore, not be allowed to advance beyond the wagon or brigade reserve line.

It is the duty of an officer commanding an ammunition park to report the arrival and notify the position of his park to the C.R.A. of the army corps, and to the officers commanding the divisional ammunition columns. Constant communication with these officers should be kept up, and any changes in position should at once be made known to them. The parks should be formed up off the roads, but close to them, and should supply all the deficiencies which the ammunition columns are unable to satisfy, and should, moreover, keep the columns replenished and fit for movement.

The empty divisional wagons will usually, it may be assumed, be sent back and filled up at the park; but when time presses, full wagons should be sent forward from the parks on the same principle as the service will work between divisional columns and brigade divisions or reserves. The position of the ammunition parks

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will be determined by general officers commanding corps, who will act in conjunction with the officer commanding artillery on their staff.

During the action captains of batteries will detail men and horses from the wagon line to replace all casualties with the guns, and should as far as possible send them to their own sections.

They will also, with the assistance of the medical officer, if it can be managed without interfering with the service of the guns, send back wounded to the wagon line, whence they will be removed to the dressing stations.

The officer commanding a column or park should entirely sacrifice the interests of his command in order to keep batteries efficient, and therefore freely send horses, men, or stores to the front as casualties occur, and thus keep the batteries able to move and fight. It may, however, happen that they will be so mauled that they will have to retire from the front to refit. This was the case at Gravelotte, when some of the batteries of the 9th Corps had to be taken out of action for some hours. They were, however, refitted with horses from the ammunition columns, and by ten cart horses, which were taken from an adjoining farm.

It would be well if officers in command of ammunition columns arranged, before horses and men have actually to be sent away, exactly who and what animals are to go. A certain number

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might be told off in reliefs, so that no further consultation would be required when a demand was received. The best horses should be sent away first, and also the men best fitted for duty with the guns. The men told off should thoroughly understand that they may be called upon to leave the column suddenly, and that they are to take their arms and their kits with them.

It will be better to send a certain number forward in a body all at the same time, and not in driblets, while the men may probably conveniently proceed at the same time as a relay of wagons, on which their kits can be carried, is going to the wagon line.

If the issue of the battle is a victory, there will probably be a considerable number of draught horses captured from the enemy, which will reinforce the denuded columns, and remounts may likewise be obtained by requisitioning, but in any case the guns are to be kept horsed and manned without any consideration as to how columns are to get along in the future. As the ammunition columns and park have a large number of gunners with them, it will probably be possible to make good losses in the *personnel* as regards gunners easily enough. The limbers will probably not be subjected to the same fire as the guns, and losses amongst drivers should be less heavy, and it would usually be possible to make them good in the same way.

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Steps should be made towards making good losses in horses and *personnel*, stores and ammunition, from the park in rear, while the action is going on, and if it is likely to be a prolonged one, it will often be necessary to commence sending forward reinforcements during the day. The parks will give to the columns with the same unselfish hand that they did to the batteries. To make good the gaps in their own organization they must communicate with the advanced depôt on the line of communications.

As regards the duties which would have to be undertaken after the action is over, it has already been indicated that the divisional columns should during the fight replenish the brigade division both in ammunition, stores, horses, and men to the best of their ability. The columns, in their turn, would expect and command similar assistance from the ammunition parks, and they should be filled up and refitted during the night, so that they may be ready to move forward early the next morning. The ammunition parks must look to the ordnance store department for a replenishment of ammunition and stores for themselves, and to the officer commanding the line of communications for a reinforcement of men and horses.

The officer in command of the artillery of the corps will have to requisition the ordnance store department for enough ammunition to fill up the park belonging to his corps. It will, therefore, be

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the first duty of an officer commanding an ammunition park to communicate with the C.R.A after an action, let him know how he stands as regards ammunition, and inform him as to how much more is to be demanded.

There will be a remount depôt at or near the base, and it will be necessary to communicate with it at once, and to report the loss of horses at the front, what steps have been taken to replace them, and how many are likely to be required.

There will further be a sick horse depôt at or near the advanced depôt already spoke of. A demand should be first made on it, for it will be prepared to receive and issue remounts when sent to the front, and at it sick or slightly wounded horses will be attended to. Horses not likely to recover should be destroyed.

That there is ample scope and verge for energy and skill on the part of officers in charge of ammunition columns will be evident from a perusal of this brief sketch of the duties which will fall to their share on active service. It is not possible to go very minutely into detail, because much must always depend on circumstances, on the nature of the country operated in, on the period of the campaign (because during a protracted one we may be sure the normal conditions of an ammunition column will become considerably modified) and on the situation of the hour; but enough, perhaps, has been said to give a man unaccustomed to the work some notion, both as to

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what he may have to do, and how he may with most facility do it.

In conclusion, it may be well to add that the work with such a column, if less stimulating than that with the fighting line, is every whit as useful. Let no man therefore despise a position in which he may play a *rôle* no less honourable and valuable than his comrade further to the front. To feed an army and supply it is as difficult and as important as to lead it skilfully. "I do not know if I am a good general," said the great Duke once, "but I am sure that I am a good commissariat officer." A man may similarly plume himself on his conduct of an ammunition column; it may be due to his care and forethought as much as to anything else that the issue of the day has been successful, and at its close he may reflect with satisfaction that—"They also serve that only stand and wait."

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CHAPTER X.

THE QUICK-FIRING GUN QUESTION.[1]

THE success of quick-firing guns for sea service has naturally roused expectation in the minds of field artillerymen. Where ships of war are concerned, however, the conditions to be dealt with by gun constructors are widely different from those on shore; the necessity is greater, the difficulties are less. It was the appearance of the torpedo boat which called the quick-firing gun into existence, for a battle-ship armed with ponderous cannon alone lay at the mercy of these tiny and swift pests, and to drive them off with her heavy guns was as hopeless an enterprise as to fight wasps with a revolver. But when black powder was used, a gun firing rapidly became blinded by its own smoke, and therefore smoke had to be got rid of ere rapidity of fire could assert its full effect. In consequence of this the dis-

[1] After I had written this chapter, the battery which I have the honour to command was detailed to carry out experiments with quick-firing guns at Okehampton, from the 15th August to 16th September, 1898. What I had written has been in no way modified or altered, but stands exactly as it did before I took over the new guns.

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covery of smokeless explosives gave a great impetus to gun construction, and on their appearance quick-firers for naval service advanced by leaps and bounds. But these new explosives, while they benefited light artillery on board ships, also endowed with increased efficiency the armament of the foot soldier on shore. It was not only that magazine rifles of small bore and perfected machine guns were called into being, but the accuracy, penetrative power, and flatness of trajectory of rifles were likewise considerably increased. Moreover, while the intensity of rifle fire was augmented, the superiority which artillery had hitherto possessed in range was diminished. We need not attach an overwhelming importance to anticipations based mainly on theory alone, but it is not to be denied that a given number of magazine rifles can now pour more bullets on an objective in a given time, and that, too, from a greater distance than the same number of older pattern rifles could have done, say, ten years ago; while, speaking generally, the potency of the shrapnel has received no counterbalancing increment. And this is true even when we bear in mind that the introduction of smokeless powder has also benefited field artillery in that it has given it a clearer view, and that the same amount of work is now done with less pressure and with a smaller charge than when black powder was the propellant. A diminution of the weight of gun

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and carriage with no sacrifice of effect has therefore become possible.[1] It may, indeed, be said that with black powder on land, as on sea, quick-firers would be impossible, or, if possible, would be of comparatively small efficiency.

That the time is ripe for field artillery to make a corresponding stride forward is universally recognized, and since the power of field guns and the capacity of their shells is governed by the question of mobility, the most obvious means (always supposing that the ballistic properties of the gun have been fully developed) of increasing the number of bullets discharged by them in a given time is to enhance rapidity of fire, at the same time insisting upon accuracy of laying. Now at this point we are confronted with the dominant factor in the problem, viz. recoil. On board ship, or in fortifications, guns can be fired off perfectly rigid stands, and the operations of loading and laying are uninterfered with. A man can keep his eye continuously close to the sight without inconvenience, and it is possible to completely reap all the advantages of a quick-firing system. But on board small vessels the end is not gained without straining and shaking the structure, and every rivet has its strength tested by the violence with which the shock of discharge has to be absorbed.

[1] Remarks by General von Rohne in "An Essay on the Shrapnel Fire of Field Artillery" (translated by Colonel N. L Walford), p. 62.

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It is impossible thus rigidly to secure a field carriage, and elaborate mechanical contrivances have therefore to be applied to it to counteract the force of recoil. With very light shells the problem would be less difficult, but all authorities have recently been unanimous in demanding a powerful shrapnel, and in condemning the idea that the effect of many shells, each feeble in itself, can equal that of those more powerful, even if fewer in number. Captain Moch, who contends for mobility even at the expense of power, has not carried general opinion with him. Neither have the views of Colonel Langlois, the warm advocate of light projectiles and rapidity of fire, commended themselves even to his own countrymen.

In this country, indeed, the basis of all specifications has lately been that the bore and weight of shrapnel of the 12-pr. of 6 cwt. be not reduced. It is recognized too that a greater weight than about 30 cwt. behind the team for a gun which has to move with cavalry, is not desirable. To construct a carriage in which recoil can be arrested without the production of "jump," within the above limits of weight, is the most difficult problem which the manufacture of quick-firing guns presents.

It is therefore desirable that this portion of the question be first considered, and it is to it that I will now turn.

When an ordinary field-piece fitted with firing drag shoes as at present is fired, the recoil amounts

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to some two or three feet. The detachment has therefore to stand clear for each round, and has usually to step in again and run the gun up. Both these processes absorb a certain amount of time, and the latter involves an expenditure of labour by no means slight. Great rapidity of fire is not to be hoped for with such a type of carriage, and the adoption of a non-recoiling one would increase a gun's rapidity of fire fourfold.

Many most ingenious methods for reducing the firing stress on the carriage have been invented; but speaking generally, almost all inventors have recognized the need for enabling the gun to recoil a fixed distance independently of, but in relation to, the carriage, by means of a recoil cylinder or some arrangement analogous to it. It is true that an increment of weight is thus directly brought about, but on the other hand, by reducing the maximum stress the construction of the carriage generally may be lightened so that the ultimate addition of weight to the whole system may be immaterial.

In the case of field carriages some arrangement or other for giving rigidity to the carriage has indeed lately been sought for by all constructors, but there may be stated to be four leading types:

(1) Brakes on the wheels (tyre or nave).
(2) Firing shoes on wheels.
(3) Spade attached to carriage axle.
(4) Plough under the trail.

The system invented by Sir George Clarke, by

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which the gun is fired limbered up, and the weight of the limber is called in as an auxiliary, is so original and unique that it should receive special consideration. In the case of 1 and 2, the wheels of the carriage are simply skidded, and the whole system recoils a short distance. In the case of 1 and 2, a certain amount of "jump" may be expected to occur, although less than that when the carriage is held at the end of the trail, and internal recoil will have to be provided for. But on hard ground, where spade or plough cannot penetrate, we may have to fall back on these assistants.

With 3 and 4 a recoil cylinder is essential, otherwise the recoil stresses are so great that no anchoring arrangement can alone be of service.

With 3 the first round fired forces the spade into the ground, and so prevents further recoil. The spade can be provided with a pivot and socket, so that the gun may be trained round it and laid. We may add here that this axial spade is fitted to the pivot by means of springs which give elasticity to the resistance, and help to arrest the "jump." The spade, moreover, must be attached to the under side of the end of the trail by means of a wire rope, otherwise it could not be held in its place.

In 4 the ploughs under the trail have also been fitted with springs, so that "jump" might be obviated as much as possible, and the gun pushed forward after firing, as the expansive force of a spring reasserts itself. The difficulty has been to

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train a gun to one side quickly with the trail thus anchored, and traversing gear has to be resorted to. The spades and ploughs have, however, in some systems been widened, and it has been found possible to move the trail across them.

Experiments have indeed shown that 3 and 4 have much to recommend them on favourable soil; but that 4 must always be associated with a spring arrangement.

The difficulty of seating the firing and laying number on the trail has scarcely yet been fully appreciated by inventors. Even to highly-trained men the shock thus communicated would be extremely disconcerting, and we cannot entertain any doubt as to whether the average gunner could sit and fire on the trail of a gun in action or not.

Finally, it is to be pointed out that since it has been found desirable to fit all quick-firing guns with traversing gear, in order to rectify the disadvantages of the inevitable spade, and develop their full powers, traversing gear figures as an essential part of every system, and that an already complicated carriage is thus further complicated.

Such gear has hitherto met with little favour in our field artillery, but since neither continental nor private firms of our own country find the difficulties connected with it insuperable, it is to be hoped that our officers may become reconciled to it.

As regards the quick-firing gun itself, it is to be

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noted that those on the continent who have lately studied the question of quick-firing guns for field service have discountenanced a less diameter of bore than 7·5 c.m. or 2·96 inches.

To quote a few examples:—A Russian writer, translated by Capt. Fraenkel,[1] advocates a bore of 7·5 c.m. and a shrapnel of from 11 to 13·2 lbs. Schneider, Darmancier, and Canet adopt the same calibre, and a shell weighing 6·5 k.g. or 14·3 lbs.: except the last named, who favours a lighter shell. Krupp has chosen a bore of 7·7 c.m.

A committee of Spanish officers, which sat in 1896 to examine into and report on the question reported in favour of a calibre of 7·5 c.m. (2·96 inches) and a projectile weighing 6·5 k.g. (14·3 lbs.).[2]

Colonel Schumacher, the head of the Swiss artillery, has also declared for the 7·5 calibre.

It is not necessary to dwell on the nature and construction of the gun itself. In ballistic properties it must not lag behind those we already possess, and it must not therefore have a less calibre than about 3 inches. It may be added that the breech mechanisms of our existing field guns

[1] "L'Artillerie de Campagne de Demain" in the "Revue d'Artillerie," June, 1896. See also the "Militär-Wochenblatt," No. 60, 1897, articles in the "Revue d'Artillerie" for March and April, 1897, and "La Nouvelle Artillerie de Campagne," by S. V. Dardier, p. 6.

[2] See the report of proceedings of this Committee in the "Revue d'Artillerie" for November, 1896, and the "Militär-Wochenblatt," No. 76, 1897.

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are certainly inferior to some recently adapted to the new weapons, and it is to be hoped that, should re-armament come, an improvement in this respect will be a feature of it. A better means of igniting the charge than that supplied by a friction tube is also desirable, and such sights should be supplied as need not be removed before firing.

The arrangement adopted in the new German quick-firing guns by which the sight is raised or lowered by a turn of the elevating wheel, is likewise one which commends itself. Beyond touching on these points I need not, however, here go further into the detail of quick-firing guns than to note that they may be divided into two classes:—

(*a*) Those which require a metal case for their ammunition.

(*b*) Those which do not.

I may further subdivide the former class into two divisions:—

(*c*) Those which require their ammunition to be "fixed."

(*d*) Those adapted for "separate" loading.

We have then reached a stage of our inquiry when the relative advantages and disadvantages of these various methods of loading and of quick-firing ammunition generally may be discussed.

The use of "fixed ammunition," or of metal cartridge cases, is attended with the following advantages:—

(1) The metal case preserves the charge water-

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proof and airproof more effectually than is at present possible.

(2) The cartridge contains its own means of ignition, and the lanyard and friction tube system, a most fruitful cause of delay in firing, is abolished. It is by no means an unusual incident at practice for a miss-fire to occur several times owing to nervousness or excitement on the part of the gunner in the detachment, and as many as five in succession have been seen by me at the same gun with a tube which eventually exploded perfectly correctly. The disappearance of our present antiquated and clumsy process of firing a field gun would indeed confer a great boon on our batteries.

(3) No ramming home of the projectile is necessary, for the case itself acts as a rammer, and the position of the projectile in the correct place for it is assured.

(4) When "fixed ammunition" is used an advantage is also gained, because there is no danger that any residue from a previous charge may cause a premature explosion. Nor does the bore of the gun become so rapidly heated as when no metal case encloses the explosive.

(5) With "fixed ammunition" more perfect obturation is obtained, because the base of the projectile penetrates for some distance into the cartridge case, and the necessary pressure for expanding the case against the bore of the gun is

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developed before any gas can overlap and get between the two.[1]

It may be noted here that the above advantages were sufficient to cause the committee of Spanish officers, already referred to, to report in favour of "fixed ammunition."

On the other hand, there are several disadvantages connected with metal cartridge cases which must not be overlooked.

(1) With "fixed ammunition" there is difficulty about the setting of time fuses behind the limber or wagon owing to its great length.

(2) The cartridge cases are liable to damage in travelling, especially so if we carry the projectile fixed to them. Jolting, a blow, or a fall may very easily produce an alteration in shape sufficient to cause jamming, while to endeavour to remove a jammed cartridge with a shell at the end of it from the fuse of which the safety pins have been detached, opens up a prospect which a gunner will scarcely regard as an inviting one. I have seen more than one of the shells of a 15-pr. jam at practice owing to burrs caused in some unaccountable manner, and the metal cases of a quick-firing gun are far more susceptible to injury than were the projectiles in question.[2]

[1] "Artillery: Its Progress and Present Position," by E. W. Lloyd and A. G. Hadcock, p. 157.

[2] A thin metal case with a heavy shell attached to the end of it is very liable to get put out of shape, and in consequence jam in loading. I have seen this frequently happen with quick-firing ammunition which has had no rough usage.

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(3) Nor can the conveyance in limber boxes of "fixed ammunition" furnished with percussion caps at the base be regarded as free from risk; even if clips, or some such covering to render the cap intangible, were invented, the danger would remain that when changing position in moments of haste or excitement such protections already removed would not be replaced.

(4) A miss-fire in the case of "fixed ammunition" might mean not only the loss of a friction tube, cap or primer, but of a shell and charge of powder too. This defect might, however, be obviated by making the primer to screw in and out of the case, as is already done at Elswick.

(5) The weight of the ammunition is added to, and aluminium has not as yet been found suitable as a material for cases. This objection is, in the case of field artillery, one of supreme importance. The limit of weight behind the team cannot be exceeded, and if we add to the weight of the cartridge cases, we must do with fewer projectiles. The additional weight due to the adoption of metal cartridge cases has been very variously estimated. One authority has stated that the weight of that for a 15-pr. would be 3½ lbs., and that a battery carrying 900 rounds would drag about a weight of 1½ tons in cartridge cases alone.[1] Such a case would, however, be unnecessarily heavy and

(Lecture by Captain Headlam, R.A., "U.S.I. Journal," vol. xxxvii., p. 753.)

[1] "Artillery," &c., by E. W. Lloyd and A. G. Hadcock, p. 294

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strong, and its weight might perhaps be reduced to 1½ lbs.

The Maxim-Nordenfeldt Company has stated the weight of the cartridge cases for their quick-firing gun to be 760 grammes, or about 26 ozs. The Spanish committee which sat to investigate the question has placed the additional weight as 10 per cent. of the weight of the shell. Even the lowest of these estimates will show that a serious increment of weight is inevitable.

(6) The additional expense involved has to be considered. For sea service or coast defence the original cost of a well-made case does not much signify because the same one may be reloaded and do duty over and over again. Experiments have shown that cartridge cases for the 4·7 inch quick-firing gun will sometimes stand as many as twenty rounds, and in the case of the 6 inch quick-firing gun as many as fifteen, although such extremely good results can scarcely invariably be hoped for, especially should cordite be used. Batteries in the field would not usually find it possible to save the cases of their cartridges, nor, even if they did so, would the subsequent burthen entailed by their being sent to the rear for refilling be one to be contemplated without dismay.

(7) The empty cases lying round a gun in action would form a dangerous impediment to limbering up; when a change of position became necessary.

(8) The storage of "fixed ammunition" in the

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limber boxes is not unattended with difficulty, while even metal cartridge cases absorb an undue proportion of valuable space. On the other hand, cartridges not enclosed in metal, or what are called "bare" charges, possess these advantages:—

(1) The weight of the ammunition to be carried is reduced to a minimum, and more rounds can be carried for the same weight behind the team.

(2) Facility of transporting and replacing ammunition in the field.

(3) The ammunition is not liable to damage except through damp, and cordite is thus not appreciably affected.

(4) It is easier to pack the ammunition in the limber boxes.

(5) Such ammunition is cheaper than that enclosed in metal cases.

The following disadvantages are, however, likewise inherent in "bare" cartridges: —

(1) They do not contain their own means of ignition, and, although this may be safer, an element of delay is involved when a primer or other means of ignition has to be introduced.

(2) Rapidity of fire is not therefore so great.

(3) There is a slight risk that the overheating of the bore caused by rapid fire may prematurely explode the cartridge. How great such risk may be we do not know at present, and cannot know until experiments have decided the point for us; but that there is some element of danger here seems certain.

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(4) The projectile requires to be rammed home, and some such other minor disadvantages, which will be obvious when the favourable aspects of metal cases are considered, remain. What, however, constitutes a more serious objection is the difficulty in igniting the cartridge by any other means than the ordinary friction tube. As has already been pointed out, the present system is fruitful of delay, and is unworthy of the advanced state of perfection to which field artillery has in other respects attained. An endeavour has been made to provide for obturation, and to stiffen the cartridge by means of metal discs so as to give it something of the cohesion of a metal one, but these discs lying about in a battery may injure horses' feet, and are not quite satisfactory. We need not, however, despair, but hope that some material other than metal may, if need be, be found to answer our purpose, or that constructive ingenuity may yet overcome the difficulties in the way.

We must not, however, lose sight of the fact that metal cartridge cases offer facilities for obturation such as no other arrangements possess. To many quick-firing systems they are essential, and their abolition would necessitate an alteration of the breech mechanism of many of our service guns.

The foregoing consideration of these various advantages and disadvantages connected with quick-firing ammunition appears to me to point towards the superiority of a "separate loading"

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system, but it also seems desirable that the powder charge should be enclosed in metal or some substance of sufficient stiffness to carry a means of ignition. The question of obturation would, in the latter case, still remain to be dealt with by means of the de Bange or other systems with which gun constructors are familiar.

So far, matters of technical rather than tactical interest have been discussed, but the contemplated introduction of quick-firing guns has called forth discussion abroad with regard to questions of a more tactical character which deserve attention.

The first and most obvious tactical advantage to be derived from quick-firing guns is that they will enable us by the rapidity with which they can be loaded, laid and fired, to overpower an opponent by what may veritably be a storm of shells at some supreme crisis of the fight. There can be no doubt that the effect of losses varies indirectly with the time taken to inflict them. A hundred men killed in five minutes in a small area would shake the nerves of the bravest troops, while a similar number disappearing gradually during the course of hours might scarcely be missed. That fire discipline will not be equal to the direction and control of the potential tempest, as some seem to fear, is to unduly depreciate both the capacity of our officers and the training of our batteries. The fire discipline which can call forth and control the present "magazine fire,"

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when guns are fired as rapidly as possible, will be equal to the occasion.

It is, however, a somewhat common error to suppose that rapidity of fire is much the most substantial advantage gained. For special occasions that undoubtedly is an immense advantage, but it scarcely is a lesser one that the various operations of aiming, loading, and firing can be carried out with a facility at present unattainable, because a quick-firing gun requires very little relaying between rounds, and has but very slight recoil. It would be impossible to get, say, three rounds per gun per minute out of our present equipment, except by most unduly straining the strength of our men and destroying careful laying or by adding to the detachment.[1] But a gun which is capable of discharging six or seven aimed rounds per minute will, with ease, compass three, and with a vastly increased chance of correct aim and effective result. And three rounds per gun per minute would at present sometimes produce a very marked effect.

It follows that a second advantage will flow from the quick-firing system should it enable fewer men to work a gun than can do so now, although in view of losses it would not appear wise to legislate for less than six, including the numbers who bring up the ammunition, and our present guns are worked with no more than these.

[1] "Magazine," and "case" fire, when guns are not run up between rounds, are here, of course, left out of consideration.

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Again, a third tactical advantage has fascinated the imagination of some officers on the Continent, and they dream that the greater facility acquired may not only enable four men, or even three, to do with ease what five or six now find laborious, but will make four guns perform as much as six are at present equal to.

It is an admitted fact that four guns cannot now fire as many projectiles in a given time as can six, and, in consequence, at practice, a four-gun battery receives a time allowance from the larger unit. It is not, in fact, possible to keep up regular intervals of ten seconds between rounds in one case, while there is no difficulty about it in the other. In short, limitations as to rapidity of fire now govern the number of guns in a battery.

During ranging, observation limits rapidity, and must do so whether quick-firing guns are introduced or not; but, when once the range of a stationary target has been determined, this drag on rapidity disappears, and it may be stated that the right gun of a battery ought to be ready to fire immediately that on the left flank has been discharged. With the Russian or Austrian batteries of eight guns there is waste of power because the right gun has to wait for its turn an undue period; with four guns, on the other hand, it is not ready when required. But if quick-firing guns were introduced, this would not be so, and four guns, or even two, could fire at shorter

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intervals than six do now, even supposing that comparatively unskilful detachments could only develop half the rate of fire per minute which has been arrived at with highly-trained men.

The foreign writers who are advocates of the new guns, have claimed then, that by reducing the number of guns in a battery:—

(1) A shortening of the marching columns (in the case of one of our army corps with seventeen batteries by a distance of nearly 700 yards), the same number of projectiles in each case being with the guns.

(2) A reduction of the front occupied in action by the artillery of a corps.

When it is considered that this front would amount to at least 2100 yards in the case of a British corps, and that a heavy penalty is incurred by a diminution of the space between guns, the importance of this point is manifest. It is often, in a country which is at all wooded, extremely difficult to find space even for six batteries, while to provide for treble that number in close proximity would occasionally be well nigh impossible. On the other hand, if ample space were found either greater intervals between guns would tend to diminish losses, or a better choice of sites might be made. It is also more easy to control and direct the fire of four guns than of six, and there would be no difference between the size of the war and peace unit as regards the number of guns in line.

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Such are the chief arguments which have been put forward in favour of four-gun batteries. It is now proposed to examine the disadvantages such an organization would entail.

In the first place, the larger unit is not affected by losses so seriously as is the smaller; the losses are distributed over a greater area, the percentage will be smaller, and the battery will be enabled to remain longer in action. A six-gun battery which has lost two gun detachments will still be as powerful as a four-gun battery, while a four-gun battery reduced similarly will only be a section, and even short of one gun will become a very weak fire unit.

It has been argued that before the introduction of quick-firing guns compel us to make so drastic a change in organization, we should try whether an alteration in the succession of fire would not meet our requirements. If we once commence reducing the number of guns in a battery, why, if in the future the rate of fire be further augmented, should we stop at four? Why not two guns if they should be able to fire as many rounds per minute as six can nowadays? With quick-firing guns we could fire by sections in place of batteries, and gain all possible rapidity in doing so.[1] The fullest powers of quick-firing guns will not be developed at "battery fire," whether four or six guns form the unit, while it is only occasionally at decisive

[1] *Vide* articles in the "Militär-Wochenblatt," Nos. 59 and 81, of 1897.

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moments that there will be need to call for the utmost from them. It is contended that thus we might get all we can hope for in the way of rapidity, and still retain an organization which has come to us as the fruit of long years of experience.

It remains to be stated that I do not favour a reduction in the number of guns, although I am prepared to admit that if batteries were armed with quick-firers it would be an advantage for a battery commander to be able to range by means of the two guns nearest him alone. It is further to be noted that the new German quick-firing batteries are organized with six guns.

A tactical difficulty which has been much dwelt upon when the imminent re-armament of field artillery has been under discussion, lies in the provision of an adequate supply of ammunition. Since, however, it is not contemplated by any one that a quick-firing artillery would exert its whole power at all stages of an engagement, but would reserve its energies for moments when defeat or victory swung in the balance, the expenditure of shells would probably not greatly exceed the present limit. It should be possible for fire discipline to ensure us from waste, while, if expenditure of ammunition were temporarily great, we must not forget that the results striven for would be accomplished in a shorter period.

The records of history do not seem to show that because rapidity of fire has been possible, expendi-

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ture of ammunition has necessarily been more lavish. For example:—

In 1866 the muzzle-loaders of the Austrians in Bohemia expended sixty rounds per rifle, as against an eighth of that number from each breech-loader of their opponents, a difference which, though capable of partial explanation, is still significant.[1] It has been stated too, that during the fighting in Spotsylvania, when muzzle-loaders were used, as many as from 300 to 400 rounds per man were fired,[2] which is a higher total than has been reached with breech-loaders. Expenditure of ammunition is, in fact, governed by fire discipline rather than armament.

The number of rounds for batteries armed with the 12-pr. of 7 cwt., carried by them and their ammunition columns (of which equipment only we as yet have official data), is undoubtedly too few, amounting as it does to only 108 rounds per gun with the battery, and 74 with the divisional ammunition column. The old 9-pr. with its second line of wagons in India, carried no less than 256 rounds per gun (148 of which were with the piece itself). The necessity for a liberal supply is greater now than it was then, but the difficulties in the way are not. With our present 15-pr. equipment there are 150 rounds per gun

[1] Mayne's "Fire Tactics," p. 281.

[2] "The Tactical Operations of the Future, &c.," by Captain G. E. Benson, R.A., "Journal of R.U.S.I.," vol. xxxv. p. 435.

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with the battery, and probably 78 per gun will be with the divisional ammunition column, but there are no official figures as yet to guide us. This gives a total to provide for each day's fighting of 220 rounds per gun. At Vionville, one of the hottest artillery fights on record, the greatest expenditure on the German side by one battery was 1164 shells, while the average number of rounds per gun fired by the 15 batteries of the 3rd German Army Corps was 130. Allowing for an increased expenditure by quick-firing guns, we may yet conclude that three more ammunition wagons per battery, an increase only placing our batteries on an equality with those of both France and Germany, which have already nine, would, especially if improved constructions could enable a wagon to carry some more shells than at present, place us on a satisfactory footing. Each 15-pr. gun would then have for disposal at least 274 rounds, even if it be found impossible to improve the existing wagons. Although, however, it opens up a question not alone affecting quick-firing guns, I may here add that, in considering how weight can be reduced, and the number of shells added to, we alone in Europe adhere to five foot wheels, while other powers who have, and have had, greater experience than ourselves, find they can do with wheels at most 4′ 8½″, and usually only 4′ 6″ high.

Granted that the higher wheel gives increased power of traction, may we not be purchasing it at

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too high a price? The command might be kept where it is by raising the gun three inches, although it must be admitted that something in that case would be lost in stability. The whole question of traction is one, however, at present imperfectly understood. On good roads we should scarcely suffer appreciably through lower wheels, how much our loss would be in rougher places no man, until we have had exhaustive experiments, can tell. What, however, is certain is that we could save some two cwt. in weight for every four wheels, by reducing our wheels six inches. Such a saving in the weight behind the gun teams would not only enormously help designers of equipment, but we could carry two cwt. more ammunition in every wagon by merely accepting what is universal on the Continent.

Ammunition supply does not in fact appear so fraught with difficulty as to put quick-firing guns out of court.

The question of supply of ammunition from the limber or wagon to the gun in action still remains, however, to be considered. If a gun is to fire six rounds per minute, it is clear that ammunition will have to be much more ready to hand than it is at present, and that a portable magazine or some other means of providing a sufficient supply for occasions demanding very rapid fire must be devised. The consequent exposure of ammunition appears inevitable, and must be faced. What are termed "Ready Magazines" have already been

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supplied to a foreign government, by Armstrong & Co., for this purpose.

The advantage which a non-recoiling equipment possesses in being better able to shelter detachments and allowing a greater choice of sites for the pieces, should finally be noticed. Personally I do not believe in shields; if really bullet-proof, they are so heavy as to hamper mobility, and in any case offer a prominent target and bursting screen to hostile shells.

Several of the quick-firing equipments newly brought out, are, however, fitted with them, and some authorities still hope for them. It is right, therefore, to mention that such protection is especially likely to be of service in the case of guns which do not need running up, and that, if ever shields are to come in, it will be through the aid of such weapons. Moreover, the lid of an axle-tree box can be rendered impervious to bullets, and the increase in weight is then but trivial, since the present "shell pockets," which are by no means satisfactory, would disappear. Twelve batteries have already been thus equipped for Canada and New South Wales, and have been well reported on.

It may also be admitted that even without shields men working quick-firing guns would be slightly less exposed than they are at present, when they have to come forward to run up the gun.

Unquestionably, too, our batteries would some-

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times gladly occupy a site too small for a carriage which recoils, but which would be available for one that does not, and in broken ground, such sites do often offer peculiar advantages as regards shelter and concealment. A quick-firing gun might be ensconced where an ordinary field-piece could not find a platform, while its detachment can crouch behind the former in a manner which men who have to avoid recoil and run up cannot hope to do.

The best test of a weapon's excellence is supplied on active service, and I have therefore endeavoured to obtain information as to how quick-firing guns have come out of that ordeal. So far, however, their war service has been very limited, and it has not been easy to get trustworthy accounts of what was done.

We have been told that during the civil war in Brazil, those of the de Bange and Piffard system acquitted themselves well; but details are not to hand, and in their absence we cannot accept generalities. According to an article by Captain Dittrich (published in the "Archiv für die Artillerie und Ingenieur Offiziere" in 1889-91), during the rebellion in Herzegovina and Southern Dalmatia in 1882, the Hotchkiss quick-firing guns of the Austrian war ships were used on more than one occasion with telling effect, and gained for themselves the title of "Broom of Fire"; but this instance can scarcely be regarded as valuable from the field artillery point of view. The

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experienced any difficulty with the "fixed ammunition."

During the late war between Italy and the Abyssinians, quick-firing guns were made use of by the latter, and the Italian officers found that their mountain guns were completely overmatched by the more modern weapons of their opponents. The Abyssinian batteries were armed with Hotchkiss quick-firing 3-pr. guns of a bore of about two inches. A correspondent tells me that an Italian officer wounded at Adowa informed him that during that engagement the Abyssinians concentrated their quick-firing guns on the Italian pieces in succession, and that the fire was so overpowering that the majority of the Italian guns were soon silenced owing to the heavy losses incurred in officers and men. These Hotchkiss guns were capable of going anywhere that the mountain guns opposed to them were able to penetrate, and experienced no more difficulty in finding suitable sites on which to come into action. It is to be noted that the Italian guns were muzzle-loaders.

Everyone who has read so far must admit that this question of quick-firing guns stands to-day on a widely different basis to what it did a few years ago.

When in 1892, Colonel Langlois, of the French artillery, published his book, which provoked in many quarters admiration, more enthusiastic than discriminating, the best quick-firing guns on

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the Continent fired projectiles only weighing 3 k.g. or 6·6 lbs., and did not develop a muzzle velocity of more than 600 metres, or 1630·5 feet, while in his essay of 1891 Captain (now Major) Benson, R.A., quotes Mr. Nordenfeldt as saying that "the heaviest quick-firing gun he can make of which the recoil is absorbed by arrangements in the field carriage, is a 7·7-pr.[1]

At the present moment, only a few years later, the skill of the gun-constructor has succeeded in about doubling what had then been accomplished. It must, however, also be admitted that this rapid development, while it discounts much of the hostility originally shown to the new weapons, at the same time justifies the doubts and hesitation of the cautious, and exposes the rash enthusiasm which would have saddled armies with inventions almost immediately shown to be very immature and imperfect.

It is also to be noted that a field carriage with *absolutely* no recoil has not yet been made, nor is ever likely to be made. On the other hand, most of the quick-firing carriages "take up" again considerably after they have run back, and laying need be altered but very slightly between the rounds. Indeed, a carriage of which the upper part slides on the lower, and in which elasticity takes the place of rigidity, appears best adapted to field artillery, and effects the desired object, even

[1] "The Tactical Operations of the Future, &c.," "R.U.S.I. Journal," vol. xxxv. p. 426.

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if some slight recoil of the whole fabric still survive.

In stating so much, however, I wish to make it clear that the highly original and clever design of Sir George Clarke, of which an account will be found in the Appendix, by which the gun is to be fired either limbered up or unlimbered, is not included in this purview. That design stands completely by itself, and until it has been thoroughly tested it is impossible to speak as to what possibilities it may not contain.

Opinion in France appears to have settled down in favour of the Darmancier or Vickers' type of carriage.[1]

It may be also conceded from what has already been brought forward in this essay, that a strong *primâ facie* case for a quick-firing field artillery has been made out. It is not proposed to accept all the statements made by manufacturers as reliable until verified by experiments carried out by our own officers, but even discounting enthusiasm, it is certain that a solid residue remains.

There is at least no disadvantage in being able to fire a gun at supreme moments with a vast rapidity, and at such moments great accuracy of laying is not required, nor would observation be necessary, because the range and fuse would usually have been found. Most of those who have produced such equipments have relied on "fixed"

[1] *Vide* "L'Avenir Militaire," January, 1897.

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ammunition, and the necessity for such has been sternly contended for. The difficulties which have been referred to already, however, seem overwhelming, and that it will be necessary to have "separate loading" for field guns appears to be inevitable. If the new gun, then, is to be a "separate loader," would not all the rapidity which is practically required be arrived at by adopting a non-recoil carriage for our existing guns? The experiment has been made, and the advantage the quick-firer possessed in rapidity was then but small. Unless, however, the records of what has since been accomplished are misleading and the promise of further improvement delusive, a rearmament of our field artillery ought to bring with it improved breech mechanism and enhanced rapidity of fire, not only without a sacrifice, but even with an augmentation of range, bullet capacity, and depth of effect of our shrapnel, just as the Lee-Metford not only surpassed the Martini-Henry in rapidity, but in range, flatness of trajectory, and penetration also.

On the other hand, according to von Rohne, the requirements of modern war will demand a shell of 15·4 lbs. and a muzzle velocity of 1863 f.s.[1] Leaving the problematical advantage of so high a M.V. on one side, the quick-firing gun has probably not yet been produced which, with so heavy a projectile, will fulfil all the conditions field artillerymen demand, but the majority of

[1] "The Shrapnel Fire of the Field Artillery," p. 61.

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artillerists confidently await its advent in the near future.

Some are enthusiastically hopeful, a few shake their heads, many counsellors propose many and various means to reach a goal for which the majority are now all agreed in striving, but in certain directions the view is fairly clear.

As regards calibre, at least there is unanimity, and about 7·5 c.m. is the accepted bore.

Neither can it justly be contended that the arrangements which allow of simultaneous loading and laying are not extremely advantageous, and that, if not yet always perfect, are at least capable of being made efficient for practical purposes.

In spite also of adverse criticism already referred to, the combination of an upper carriage or cradle fitted with traversing gear and recoiling relatively to a lower carriage, seems to be accepted as a practicable expedient.

Opinion is still somewhat divided as to recoil cylinders, but in some form or other they are probably indispensable to a quick-firing gun of adequate ballastic power.

There is, in fact, no vital divergence in professional opinion as to the feasibility of producing a quick-firing gun for field artillery, and gun constructors have done so much and gone so far that their efforts must command attention, and call at least for full and exhaustive experiments on our part.

"That the field gun of the future will be a quick-

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firing gun, or, at any rate, one which will enable a six gun battery to fire thirty rounds per minute in place of fifteen, up to now the maximum, appears tolerably certain," says General Wille, in summing up his researches on the "Field Gun Question" (page 398), and his opinion will, it is believed, coincide with that of those who have followed me so far.

Circumstances have meanwhile considerably altered. Technical requirements and professional opinion have ere now had to give way before other considerations; it is likely that in this case influence sometimes inimical will come to their assistance.

There is little doubt that the great powers on the Continent, when they undertake the inevitable re-armament of their field artilleries, will adopt the quick-firing principle, and von Löbell's "Militärische Jahresberichte," published in March, 1897,[1] states "that it is only a consideration as to the cost involved that blocks the way."

But at the moment of writing it is believed that at least three corps of the German army have actually been equipped with quick-firing guns, which have a bore of 7·7 c.m., or about three inches, and are fired by means of a trigger and lanyard. Recoil is arrested by means of a spade at the end of the trail. The gun is mounted on trunnion bearings on an upper carriage fitted with traversing gear, as in the Vickers-Maxim system.

[1] Page 482.

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The German trail is, however, very short, and the "jump" must probably be considerable. The weight of the equipment is believed to be about 32 cwt., and the weight of the shell 12½ lbs.; with a specially light horse artillery gun it would be less.

More detailed information regarding this armament is not easily to be obtained, as the Krupp firm will not supply it in the same manner as our English firms are ready to do; but it is believed that the ammunition is "separate," the cartridge being enclosed in a metal case carrying its own means of ignition. The sight also works automatically with the elevating screw. In addition to a broad spade or scraper under the trail, there are nave brakes also fitted to the wheels to check recoil, but that force has not we may be sure been completely eliminated, and the gun requires slight relaying between the rounds. Such meagre details do not greatly add to our knowledge of the subject, but the mere fact that the German army has been armed, to a not inconsiderable extent, with quick-firing guns gives an immense impetus to the question.

The lead of Germany will very likely be followed by others, and political pressure will arise which may prove overpowering. We know, indeed, that the French are making great efforts towards a supply of quick-firing guns, and that a large number have already been manufactured, while a further quantity are in progress.

Will any party or any ministry face the

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responsibility of sending troops equipped with the old guns to face a foe armed with the new? The first reverse would be attributed to negligence of due precaution, a revolution might supervene abroad, and even amongst ourselves a ministry might fall. We may, therefore, soon expect to see a quick-firing field gun as universally accepted as was the magazine rifle; and it were expedient, if we, the richest nation in the world, whose small army should be the best equipped, lost no time in preparing for the new departure.

It is not desirable to make any decisive change all at once. But a quick-firing gun would seem well adapted for horse artillery, and we might commence tentatively, at any rate, with that arm of our service.

The case, since none of the existing systems command an unassailable pre-eminence, is indeed one for experiment on a fairly large scale. Until we have a few experimental batteries of three or four guns each equipped with various patterns of the new equipments and practising with them at Okehampton, we are but groping in the dark. Small experiments carried out by manufacturers are not reliable. The men working the guns are almost always practised experts. The ground is more or less carefully selected. No attempt to represent service conditions, movements into and change of position, is made. We want to see a battery or two moving over Dartmoor, and testing the guns as they would be tested on service. Then

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we should have some chance of knowing exactly where we stand, and thus we might find a reliable system, and proceed to equip, tentatively, some portion of our army with it. Such experiments would cost several thousand pounds, but such a sum is but paltry in comparison with the issues involved. In former days we may possibly have been able to count something on the superior physique of the British gunner; we can now do so no longer, and cannot afford to despise any advantage which mechanical contrivances may give us. In a matter of national importance several thousand pounds should not deter us from arriving at a sound solution, and until we have tried and tested the pretensions of the new arms, under service conditions, and in sufficient numbers to make the results convincing, we cannot watch the progress of events on the Continent without uneasiness.

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APPENDIX.

A PRÉCIS OF THE MOST IMPORTANT SYSTEMS ON WHICH QUICK-FIRING GUNS ARE CONSTRUCTED.

HAVING in the preceding pages discussed the advantages and disadvantages, both technical and tactical, offered by quick-firing systems generally, I have supplied in this Appendix some account of how various constructors have endeavoured to deal with the problem. In the space at disposal it is not possible to explain even one system fully, but the sources from which information has been derived are always given, and those for whom a curt précis is not sufficient, and who desire to study details carefully, will have no difficulty, therefore, in finding what they require.

In addition to those mentioned there are also other systems which, for want of space, are not even named in these pages. The ideas which have seen the light at Elswick, in Austro-Hungary, Russia, and Switzerland, come within this category, and those who desire more information concerning most of them will find them discussed by General R. Wille in his well-known book, "Zur Feldgeschützfrage."

SCHNEIDER'S SYSTEM OF 1895.

(*Vide* "Revue d'Artillerie," March, 1897.)

The newest pattern of this system differs only slightly from that of 1893, of which it is a development.

A special interest for us attaches to it because in 1896 Schneider and Co. delivered a complete battery of these guns to the South African Republic.

Weight of gun and limber packed, with 36 rounds of ammunition ...	1700 k.g. or 33·6 cwt.
Calibre of gun	7·5 c.m. or 2·96"
Weight of shrapnel shell (234 bullets)	6·5 k.g. or 14½ lbs.
Muzzle velocity ...	... 560 m.s. or about 1837 fs.
Rapidity of fire ...	... 8 to 10 rounds per minute.
Height of wheels... ...	1·5 m. or 59"
Track of wheels	1·2 metres of 39·3"

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The gun is attached to a cradle sliding on the lower carriage, the recoil of which is absorbed by means of a recoil cylinder (hydraulic buffer). A spade, which is given elasticity by means of springs, and which is of the same pattern as that invented by General Englehardt, of the Russian Artillery, is attached to the end of the trail and checks the recoil of the lower carriage.

The gun is provided with traversing gear which enables the layer to train it through an angle of 3° on each side independently of the trail. The article referred to above gives the results of certain experiments carried out with this gun in October, 1896.

They may be briefly summed up as follows:—

The projectile weighing 6·5 k.g. and the powder charge 800 grammes, the carriage being placed on hard slag.

The first ranging round gave a recoil of 6·50 m.m., or about 25″.

A series of six rounds of rapid fire was fired on the same ground in forty-two seconds with a total recoil (for all six rounds) of 3·350 metres of 3·66 yards.

In all these experiments the gun was already loaded when the series commenced.

A similar series fired on soft clayey soil in the same time gave a total recoil of 1·2 metres, or 1·3 yards.

A second series of six rounds was fired on the same soil in forty-six seconds with a total recoil of 600 m.m. or 23·6″.

On soft stony ground a series of five rounds of rapid fire was fired in forty-four seconds, with a total recoil of 850 m.m. or 33·4″, while seven rounds, fired in fifty-nine seconds, gave a total recoil of 1·75 metres, or about two yards.

The narrowness of the track of the wheels will at once strike us as a grave disadvantage, while the length of the gun, about 8 feet 2 inches, is also very objectionable.

QUICK-FIRING GUNS OF THE CANET SYSTEM.

These are manufactured by the "Société des Forges et Chantiers de la Méditerranée" and are the invention of its director. They are made in three calibres, 7·5 c.m., 7 c.m., and 6·5 c.m., and there are light and heavy natures of each calibre. Since, however, the first is the one best adapted for field artillery, it alone will be dealt with here.

A full account of the gun is to be found in the "Revue d'Artillerie" for November, 1896.[1]

[1] See also "Militär-Wochenblatt," No. 1, 1897.

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The following salient facts have been compiled from the longer account. Four men only are required to work the gun.

	Light.	Heavy.
Weight of gun and limber with 35 rounds of ammunition	1260 k.g. or about 24·7 cwt.	1555 k.g. or about 30 cwt.
Initial velocity	500 m.s.[1] or 1640 f.s.	600 m.s. or 1968 f.s.
Weight of the shrapnel shell	4·6 k.g.	5·2 k.g.
Height of wheels ...	3′ 4″	3′ 4″
Track of wheels... ...	3′ 5″	3′ 5″

The method by which the recoil is absorbed is as follows :— The trail is composed of two steel cylinders, one fitting inside the other after the manner of a telescope, and in connection with which a hydro-pneumatic brake arrangement acts on the wheels. To the upper cylinder the gun and the upper carriage or cradle is attached, while the lower cylinder forms the lower carriage and is fitted with a spade which the shock of discharge of the first round embeds in the ground. A traversing gear arrangement enables the gun to be trained by the layer through an angle of 4° on each side.

The extent to which recoil is obviated naturally depends largely on the nature of the soil on which the gun is fired, but it is stated never to exceed 1·179 inches as regards the spade, which, after some firing, is not moved at all. The whole of the upper carriage bearing the gun slides back when a round is fired, the upper cylinder is forced into the lower, and the powers of the brake arrangement are called into play without producing any jump. When the force of recoil is exhausted it is stated that the cylinders again open out, and the gun and upper carriage are again pushed forward into the same position which they originally occupied. The evenness with which the force is exerted, and the absence of anything like a violent shock, are, it is claimed, very noticeable. The direction of the piece is usually so little disturbed, that relaying between rounds is reduced to a very slight and easy operation.

It is said that the gun can be laid by means of the traversing gear as much as 4° on each side without any disadvantage.

[1] It is said that greater muzzle velocities may be obtained by using a different explosive, but these can probably be left out of consideration, as they are obviously out of proportion to the lightness of the equipment.

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The shrapnel is constructed with a burster at the base. The results of the experiments to which these guns have been subjected are stated by the above-quoted authorities to have been very satisfactory, but they do not appear to have been conducted on anything but a small scale. On the other hand, it has been stated that experiments have revealed a leakage of air always constituting a difficulty when even small cylinders are in question.

Interesting as the system must be to us, it is obviously in some other respects also very open to criticism, and the relationship between the high muzzle velocity and the lightness of the gun and carriage is especially objectionable. The smallness of the projectile is likewise incompatible with what is demanded from a shrapnel shell for modern field artillery. It has been suggested to increase the weight of the shell to 6·7 k.g., with 270 bullets, and at the same time reduce the muzzle velocity to 450 metres, and it is anticipated that thus the effect of the gun will be increased. But such views are entirely theoretical. Another grave fault in this system is the danger that a slight blow might so damage the telescoping arrangement of the trail as to render it unserviceable. Another very great objection to the carriage is that the track of the wheels is only 4·1 feet, while their height, 4·3 feet, is unduly small. It is stated that[1] in the latest patterns of these guns the ammunition is not carried "fixed," as was the case until quite recently, but that the number who takes the shells from the limber boxes attaches them to the cartridges, which are made up in metal cases, at the moment when they are required. The arrangement for doing this is stated to be extremely simple and expeditious.

Since this information was compiled, I have learnt that M. Canet has severed his connection with the "Forges et Chantiers" and has joined "Schneider's," which firm is now known as "Schneider-Canet."

DE BANGE AND PIFFARD SYSTEM.

(*Vide* "Revue d'Artillerie," June, 1897.)

This system is manufactured by the "Société des Anciens Etablissements Cail," with a bore of 7·5 c.m., and is interesting because guns constructed according to it, but of lighter pattern than the newer designs, were used during the recent

[1] *Vide* "Die Frage der Feldgeschütze," by Major Schott.

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Civil War in Brazil, and are stated to have given very satisfactory results.

Five batteries of a newer type, which is below described, have been recently delivered to the Republic of Uruguay.

The weight of the gun and carriage is ... 860 k.g.
" " " limber with 36 rounds is ... 1535 k.g. (or about 30 cwt.)
" " shrapnel is 13 lbs. 10½ ozs.
The M. V. is 530 m.s. or 1738·8 f.s.
The diameter of the wheels is 4′ 3″
The track ... ... 4′ 7″

The trail is characterized by its length and is fitted with a spade at its end, which, together with the brakes applied to the wheels when necessary, renders the lower part of the carriage practically immovable. The gun is attached to a cradle of bronze, which moves on two slides forming cheeks to the lower carriage, and curved sharply upwards. The upward swing of the gun on recoil is stated to counteract that tendency to rotate round the point of the trail which develops "jump," and to practically eliminate that defect. As the force of recoil, which is controlled by a hydraulic brake acting in combination with a chain wound round a drum, is exhausted, the gun slides down again into its former position.

The first round is laid for direction by the handspike, but smaller changes of direction by machinery which enables the gun and cradle to be trained laterally on the lower carriage. The ammunition is "fixed" and is carried according to a novel arrangement in revolving stands or turntables in the limber boxes. The cartridges hang in these with the projectile downwards, twelve in each turntable, of which there are three in each limber. The limber has only one box, which opens to the rear, and as a projectile is needed the turntable is turned round, and the shell, as it comes to the front, removed. All the experiments, of which data have been recorded, were conducted with a view to testing the strength and perfection of the mechanism and the accuracy of the gun, rather than the extreme rapidity which could be developed by it. It is stated that 14 rounds were fired with but very slight alteration in laying becoming necessary, and that in no case was there more deviation than could be rectified without moving the trail. The breech mechanism and the other fittings are said to have shown themselves perfectly satisfactory. We are also

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told that the experiments conducted by the Uruguayan Government since it has received the new guns have also been extremely gratifying, although no accounts of them had at the moment of writing come to hand.

DARMANCIER SYSTEM.

(*Vide* "Revue d'Artillerie," April, 1897.)

These guns are manufactured by the St. Chamond Company, and are of two calibres, 7 c.m. and 7.5 c.m. respectively, each of which is adapted to a light and heavy gun.

	Light.	Heavy.
Weight of gun and limber, packed with 36 rounds of ammunition ...	1560 k.g. (about 30 cwt.)	1740 k.g. (about 34 cwt.)
Initial velocity	525 m.s. (1722 f.s.)	600 m.s. (1968 f.s.)
Weight of shrapnel (294 bullets) ...	... 6·5 k.g. or 14½ lbs.	ditto
With relaying	12-15 rounds per minute	ditto
Rapidity of fire— Without relaying ...	... 20 „	ditto
Diameter and track of wheels	4′ 5″	4′ 5″

In this system the principle of utilizing the whole weight of gun and carriage in the absorption of recoil is highly developed, the whole of the fabric recoiling on an under carriage, which is represented by a recoil cylinder, one end of which is in gearing with the fore part of the carriage, and the other is fitted to a spade under the end of the trail. This recoil cylinder is also furnished with a strong spiral spring, which draws the carriage up to its original position after the recoil has been exhausted. The wheels are also controlled by block tyre brakes which are pressed against them when necessary by the action of levers worked by a crank, close to the axle-tree. The gun is fitted with a de Bange pad.

The length which the gun can slide back relatively to the lower carriage is 1 metre (39·37 inches).

The gun is provided with traversing gear, permitting traversing through an angle of 3° on each side. The heavy gun was tested on the 23rd December, 1896, when the ground was frozen and hard, with the following results :—

After the first round the spade embedded itself in the

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ground, and formed a fixed point on which the carriage recoiled, and returned again to its original position, which, it is stated, was unaltered after fourteen rounds had been fired. During rapid fire it was possible to fire 10 rounds in 61 seconds, the gun being relayed between each round. Such relaying could always be accomplished by means of the traversing gear.[1]

On sand three ronnds gave very similar results; on a hard smooth surface very favourable to recoil the carriage, when the spade was removed from it, recoiled as much as 4·5 metres.

A series of experiments, undertaken on the 28th July, 1896, with the light gun fired four times on ground sloping 7° to the rear showed, it is stated, that the spade inserted itself completely into the ground, and that the gun was brought back to its original position after every round, the upper carriage recoiling 1·8 of a metre relatively to the spade, which remained fixed.

After ten rounds of rapid fire on macadam made of granite pebbles the upper carriage recoiled 1·2 metres, and the spade 15·7 inches. On very firm macadam it was found that by digging a narrow cut to receive the spade, movement of the lower carriage could be stopped altogether.

We are further informed that the Darmancier system, having given satisfaction at the firing experiments, was next tested in a variety of ways, and was subjected to travelling tests, being sent 100 k.m.[2] on chance roads, then on a march of 250 k.m., and, finally, on one of 500 k.m., during which the conditions obtaining on active service were as far as possible reproduced.

It is stated that the results were again satisfactory; according to Löbell,[3] the Darmancier system is that which meets with most approval in France. This gun is adapted for metal cartridge cases and "fixed ammunition," or for separate loading with the powder charge in the usual bags.

It is also to be noted in its favour that four men only are considered enough for its detachment, an advantage which is regarded as an important one.[4]

From another source I have learnt that a Darmancier field

[1] It will be noted that the rapidity claimed in the tables does not appear to have been arrived at.

[2] 1 k.m.=·621 mile.

[3] Von Löbell's "Militärische Jahresbericht," 1896, p. 429.

[4] *Vide* a criticism of the system which appeared in the "Militär-Wochenblatt," No. 60, of 1897.

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gun has been designed, the whole equipment of which, without detachment, weighs 1657·5 k.g. (about 32 cwt.); its muzzle velocity is 520 m.s. (about 1720 f.s.); the weight of projectile is 6·7 k.g. (nearly 151 lbs.); the charge is ·68 k.g. (about 1½ lbs.).

MAXIM-NORDENFELDT SYSTEM.

This firm has produced a quick-firing equipment which weighs, with 36 rounds in the limbers, 33 cwt.

The diameter of the bore is 7·5 c.m., or 2·96 inches.
The weight of the shrapnel (250 bullets) is 13¼ lbs.
The M. V. of the shrapnel ... ... 1640 f.s.
The diameter of wheels ... ... 4′ 3½″
Recoil of carriage on soft ground is 1′ to 2′ 6″
" " hard " 1′ to 3′

After the first two or three rounds with careful laying:—
10 rounds of shrapnel per minute.
15-18 " case " "
The ammunition is "fixed."

The recoil is checked principally by two recoil cylinders, placed one on each side of the gun, which recoils in a cradle, and is attached to the piston rods of the cylinders by lugs on each side of the breech. The end of the trail is fitted with a small spade or scraper, sufficient to grip the ground, and to a certain extent counteract recoil. The wheels are also braked during firing by tyre brakes. There is a seat on the left side of the trail for the gunner who lays, should he desire to remain seated during firing.

The gun is fired by means of the pull of a lanyard which releases a firing pin, and enables it to strike the cap at the base of the cartridge case.

It is said that at trials abroad, at a range of 2500 yards, 10 rounds of shrapnel (careful aiming) were fired in 59 seconds, and 18 rounds of case in a minute.

Full particulars and diagrams of this system will be found in a handbook by S. V. Dardier and published by Berger-Levrault et Cie., at Nancy. The figures above quoted refer to a gun of a later design than those there discussed, but the breech mechanism and remainder of equipment remains the same.

THE VICKERS SYSTEM.

The Vickers' firm, now incorporated with that of Maxim-

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Nordenfeldt, under the name the Vickers-Maxim, has acquired the patents of the system known as Darmancier from the St. Chamond firm, and has produced an equipment of which the following brief description has kindly been supplied to me by the secretary. As will be seen, its mechanism very closely resembles that already described under the head of the Darmancier system.

It consists of the following principal parts:—

(*a*) The trail.
(*b*) The top carriage.
(*c*) The hydraulic buffer.
(*d*) The wheels and axle-tree.

The characteristic feature of this mounting consists in the way in which the recoil is taken up. A long recoil is allowed for, viz. about 39 inches, so that there is no sudden jerk or strain on the structure, but throughout the whole travel, the energy of recoil is gradually absorbed by an hydraulic buffer and spring, and a part stored up in the spring, until the moving parts are brought to a state of rest. Then the spring re-asserts itself and returns the gun to the firing position without loss of direction. The system may be briefly described thus:—

All parts of the mounting are free to recoil, except the hydraulic buffer, which is placed between the outside plates of the trail; the front end of the buffer piston is keyed to the front end of the mounting, and to the rear end of the cylinder is fixed a strong spade. The cylinder is further connected to the trail by a chain.

The trail is made of special form and length in order that it can slide freely back and so obviate all "jump." On firing, the spade is forced into the ground, thereby arresting all movement to the rear of the cylinder, but the trail, &c., being free to move to the rear, pulls back the piston rod and forces it into the cylinder, thereby displacing the liquid and compressing a powerful spring, which, after the recoil has been all absorbed, serves to run the gun forward to the firing position. The energy of recoil is therefore gradually absorbed by:—

(1) The action of the fluid in the buffer.
(2) The compression of the spring in the cylinder.
(3) The overcoming of the inertia of the gun, mounting, &c.

The gun is connected by trunnion bearings to the top carriage, which is pivoted to the front part of the trail, so that it can be trained through an arc of 6° (i.e. 3° on either side of the axis of the mounting), thus permitting of small adjustments in laying without having to move the trail.

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If required, the hydraulic buffer can be removed in about one minute, and the mounting used as an ordinary field carriage, the recoil (which is then about 7 feet only) being checked by means of ordinary shoe brakes applied to the tyres of the wheels.

The advantages claimed for this system are:—

(1) An efficient method of absorbing the energy of recoil and returning the gun to the firing position without disturbing the laying and without subjecting the mounting to any excessive strain.

(2) The combination of a quick-firing gun with a light construction of mounting, which is due to the length of recoil and to the mass of the recoiling parts.

(3) A quick-firing system suitable for all service conditions.

(4) Simple and efficient means for traversing and elevating without having to move the trail.

(5) The lightest possible type of mounting by which its "mobility on service" is not lost, in combination with a field quick-firing system. This result is entirely due to the distance allowed for recoil and to the fact that all parts of the mounting, except the cylinder, are free to recoil.

The following additional details are given:—

The shrapnel shell is of the service pattern, weighing 12½ lbs. and containing 162 bullets.

The muzzle velocity is 1700 f.s.

The ammunition is not "fixed," the charge "bare."

The equipment has been designed to use the service "T" tube.

The sight need not be removed when the gun is fired.

The weight of the wheels is only 275 lbs. per pair.

Their track and height are 5′ 2″ and 5′′ respectively.

The weight of equipment is stated by the firm to be 30 cwt., including mounting, limber, and 40 rounds of ammunition.

The rate of fire is reckoned at twelve aimed rounds per minute.

SYSTEMS INVENTED BY SIR GEORGE CLARKE, K.C.M.G.

There are three, numbered below 1, 2, and 3.

(1) The gun is fired limbered up (the horses having been previously removed) and the entire weight behind the team utilized to absorb recoil. A spade is hung from the axle-tree of the gun by means of a hollow pillar which contains a spiral spring and telescopes on itself in a manner which tempers the jar of recoil with elasticity. If desired, the gun can be unlimbered before firing, and in that case a spade under the end of the trail is also called to assistance.

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The results of certain rough experiments to which the gun has been subjected have shown that when unlimbered in the usual way it recoiled:—

The first time of firing		24″
The second	,, ,,	16″
The third	,, ,,	20″

It was only fired twice limbered up, when the distance recoiled was reduced to 12″ and 6″ respectively. A portion of this recoil was, however, again taken up.

The results of five rounds, fired when the gun was limbered up and the pole was on the ground, on each of two other days of experiment, showed that the first round caused a recoil of 18″, the second one of 8″, and the third one of 10″, while subsequent rounds only caused an average recoil of 7″. After the third round the carriage went up again after recoiling, and a very slight adjustment of elevating and traversing gear would have brought the gun on the target. The whole of the equipment for these experiments was makeshift and might have been considerably improved upon.

Although the strains thrown on the wheels will scarcely admit of full advantage being taken of it, the gun can be trained by the layer through an angle of 20° on each side.

It is claimed that the spade under the axle-tree, acting as an elastic cushion, completely controls the "jump" of the gun when fired limbered up, and there certainly are in this system fewer complications of machinery than in those which rely on sliding cradles, or upper carriages. On the other hand, the exposure of some forty rounds of ammunition in close proximity to the gun appears to some not without an element of danger, and on certain occasions when the quick-firing properties of the gun might be most needed, and the non-recoiling advantages of the system in most request, it might be inexpedient to remove the teams, and the highest qualities of the system could not therefore be developed, since, when fired unlimbered, "jump" is much increased. It should not, however, be forgotten that if the most is to be got out of a quick-firing gun its ammunition must be very near it, and it may as well be in the limber boxes as anywhere else, especially when it is considered that their backs might be protected with Cammell's steel bullet-proof plates at but a small additional weight.

Another objection to this most ingenious arrangement is that it would not be so easy to conceal guns limbered up as when unlimbered, while the difficulties of finding suitable sites

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for them would also be added to, and that it would not be possible to quickly throw them to a flank to meet a sudden attack.

(2) It is understood that an equipment designed as above is now in process of manufacture. Sir George Clarke's second system adopts a gun carriage so arranged as to dispense with a limber altogether, the trail being lengthened sufficiently to form the pole as well. The ammunition is carried packed in receptacles in front and rear of the axle-tree of the gun carriage, and the equilibrium is so arranged that a weight of not more than 25 lbs. need be brought upon the end of the pole. The ammunition would here undoubtedly serve to protect the gun detachment, but the risk of exposing it is slightly accentuated, while its injudicious removal or distribution (a danger which it should, however, be perfectly possible to avoid) might unduly disturb the balance.

It also is possible that the gun might more easily be upset than when there are four wheels to steady one another. The idea which underlies this system is both bold and original, and must have a certain fascination for field artillerymen, because it offers them an equiqment practically identical with our present 12-pr., but which only imposes a burthen of 26 cwt. upon the team. The recoil is again principally checked by means of the telescopic post and elastic spade under the gun axle, which has already been described.

So far as I am aware, no experiments with this equipment have as yet been carried out.

(3) The third pattern of equipment which Sir G. Clarke has invented is fitted with a sliding cradle on which the gun is carried, and which can recoil 24 inches relatively to the lower carriage. Its movement is controlled by means of a hydraulic buffer, while the gun is run up after being fired by powerful springs stowed in the trail.

The long distance which the cradle is enabled to recoil absorbs a very large proportion of the shock of discharge, while it is claimed for the mechanism that it is, at least, not more complicated than is that of all patterns of quick-firing equipments which rely on the same principle.

It is expected that a rate of fire equal to from 6 to 8 rounds per minute will be arrived at with each of these equipments.

It should be added that the calibre of the gun, weight of shell, height and track of wheels, muzzle velocity, &c., of the 12-pr. of 6 cwt., have been adhered to in all Sir G. Clarke's designs, and that the weight behind the team of our present horse artillery equipment is never exceeded.

The designer has, however, been hampered by the 5′ wheel

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being insisted on in our service. With the 2 cwt. which the 4' 6" wheels would give him to come and go upon, No. 1 pattern might be modified so that there would be as little "jump" with it when fired "unlimbered" as when "limbered up," and an admirable non-recoil equipment not exceeding 30 cwt. could be produced.

THE END.

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